

# MARINE REVIEW

VOL. XVIII.

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No. 18.

## NAVAL ARCHITECTS AND MARINE ENGINEERS.

(STAFF CORRESPONDENCE.)

New York, Nov. 10.—The annual meeting of the Society of Naval Architects and Marine Engineers, which opened here this morning, promises to be the most successful ever held by the society. Fifty new members were elected. The only change among officials of the organization for the coming year is the election of Geo. W. Dickie of the Union Iron Works, San Francisco, to succeed the late John F. Pankhurst of Cleveland in the council. A group of portraits of president and vice-presidents was printed in the Review a few weeks ago. These are: President, Clement A. Griscom of Philadelphia; vice-presidents, Chas. H. Cramp, Geo. W. Melville, U. S. N., Wm. H. Webb, T. W. Hyde, Philip Hichborn, U. S. N., Frank L. Fernald, U. S. N., Geo. W. Quintard, Chas. H. Loring, F. M. Bunce, U. S. N., E. A. Stevens, Irving M. Scott and Theodore D. Wilson, U. S. N. Portraits of members of the council are printed herewith.

## IRON ORE SHIPMENTS—FREIGHT SITUATION.

Although iron ore shipments were greatly curtailed on account of the unfortunate boom in grain freights that came too early in the season, it is still probable that the total output, lake and rail, in the year 1898 will exceed 13,500,000 gross tons, which is a full million tons more than the out-

## CANADIAN CANAL TOLLS.

It is feared in shipping circles that the British and United States Joint High Commission, appointed to consider matters of commercial difference between Canada and the United States will take no action on the question of abolishing Canadian canal tolls, but there is no lack of interest in the subject on the part of lake vessel owners and commercial bodies in lake cities. The brief forwarded to the commission a short time ago by the Lake Carriers' Association has since been followed by a similar document from the Chicago board of trade, which was prepared by a committee consisting of Lloyd J. Smith, James S. Dunham and John G. Keith. A concluding paragraph in the argument of the Chicago organization is as follows:

"We respectfully beg the honorable commission to bear in mind that the present exactions imposed upon American commerce passing through the Welland canal do not, and never will, increase the shipments of grain to Canadian ports, although it may increase to the extent of a paltry sum the Canadian revenue. The merchants of the United States are able, though at considerable cost, to successfully meet the restrictions which this toll imposes upon our commerce; they have solved the varied problems presented by competition; they will continue to surmount disadvantages imposed by Canada upon American merchandise transported through the Welland canal, and will ship grain to foreign markets by way of our own



## SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS.

### MEMBERS OF COUNCIL.

Frank E. Kirby.  
W. F. Durand.  
W. M. McFarland.

Washington L. Capps.  
C. H. Peabody.  
Charles H. Haswell.

John F. Pankhurst, (deceased).  
William H. Jaques.  
James E. Denton.  
Stevenson Taylor.

Frank B. King.  
Horace See.  
E. Platt Stratton.

put of 1897. The total output, lake and rail, in 1897 was 12,469,638 gross tons. Reports to Cleveland ore sales agents show shipments during October, just past, of 1,551,415 tons, against 1,462,712 tons during October of last year. The total output by lake to Nov. 1 of this year is therefore brought up to 12,545,566 tons, against 11,270,283 tons on the same date a year ago. It will be noted that the lake shipments to Nov. 1 of this year are nearly 100,000 tons in excess of the entire output, lake and rail, in 1897. It is gratifying to find, however, that all the ore companies are short of estimated production and that there is still every reason to expect a more general clearing up of stocks next spring than for many years past.

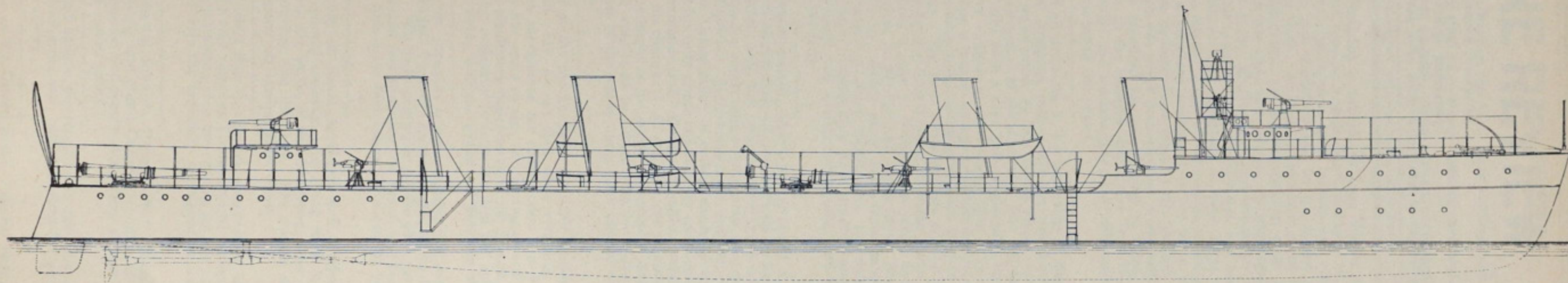
The disadvantage of an early spurt in grain freights, unwarranted by the movement of grain from Lake Superior, which up to this time is not equal to that of a year ago, as shown by the St. Mary's Falls canal reports, is now felt by the vessel interests. Ore freights have dropped to 70 cents from the head of Lake Superior, with a short supply of cargoes even at that figure. There is no grain at Duluth except for vessels that were chartered on the advancing market of two weeks ago, and unless the grain movement in the last two or three weeks of the season is again active, the closing will have a bad effect on next year's business.

Atlantic seaports, as cheaply and as favorably in all respects as grain can be shipped to such markets by way of Canadian ports. We repeat, Canadian ports do not, and will not, gain one bushel of grain by adherence to its existing policy; on the other hand, we are persuaded that the volume of Canadian business would be greatly augmented by the abolition of the tolls which are inflicted upon American shipments via the Welland canal. The inquiry is a pertinent one, to-wit: that if the Dominion of Canada is pursuing a policy which does not contribute to her commercial advantage, and yet which results in a grievous tax upon the commerce of the United States, does the Dominion of Canada desire to maintain that policy?"

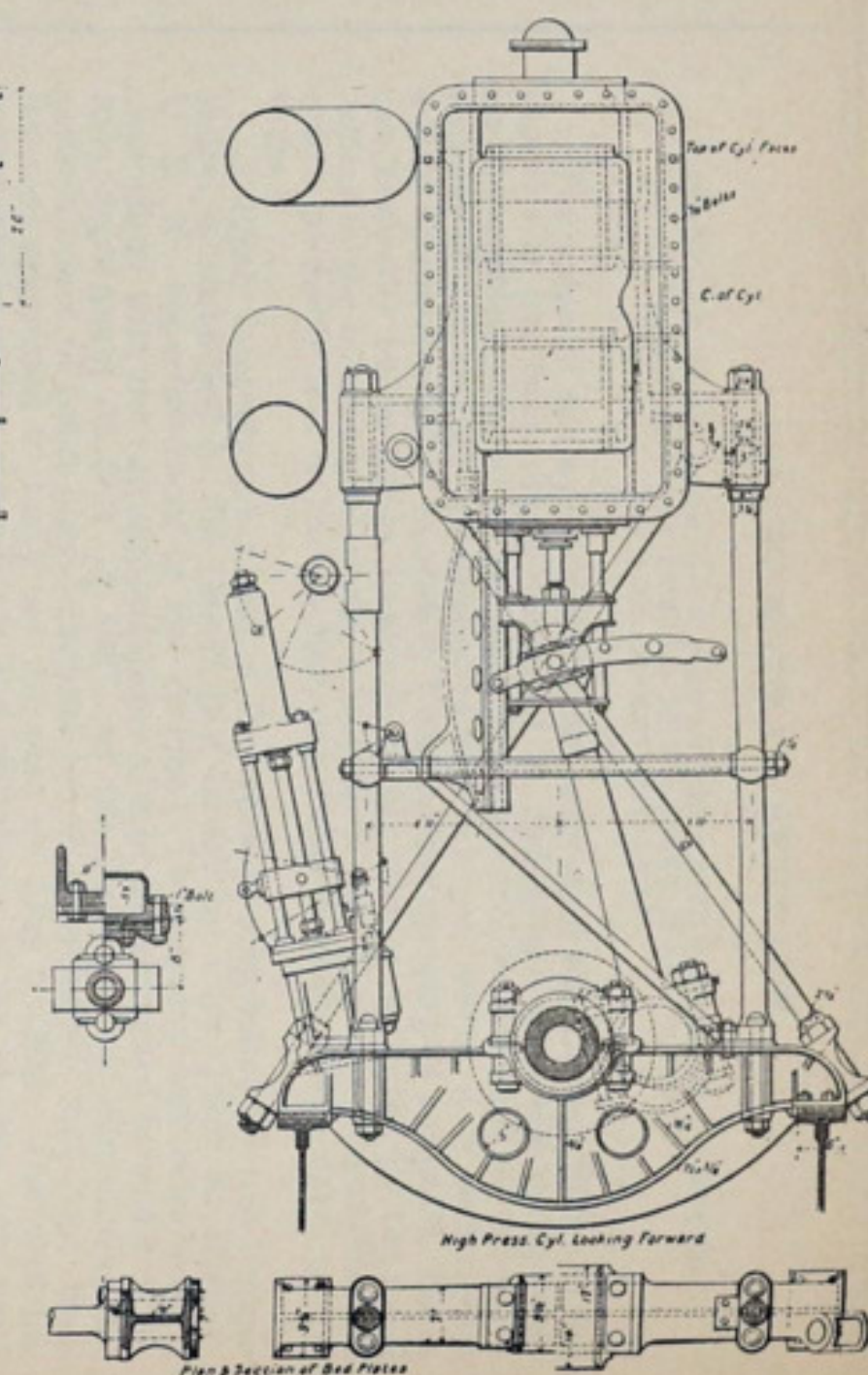
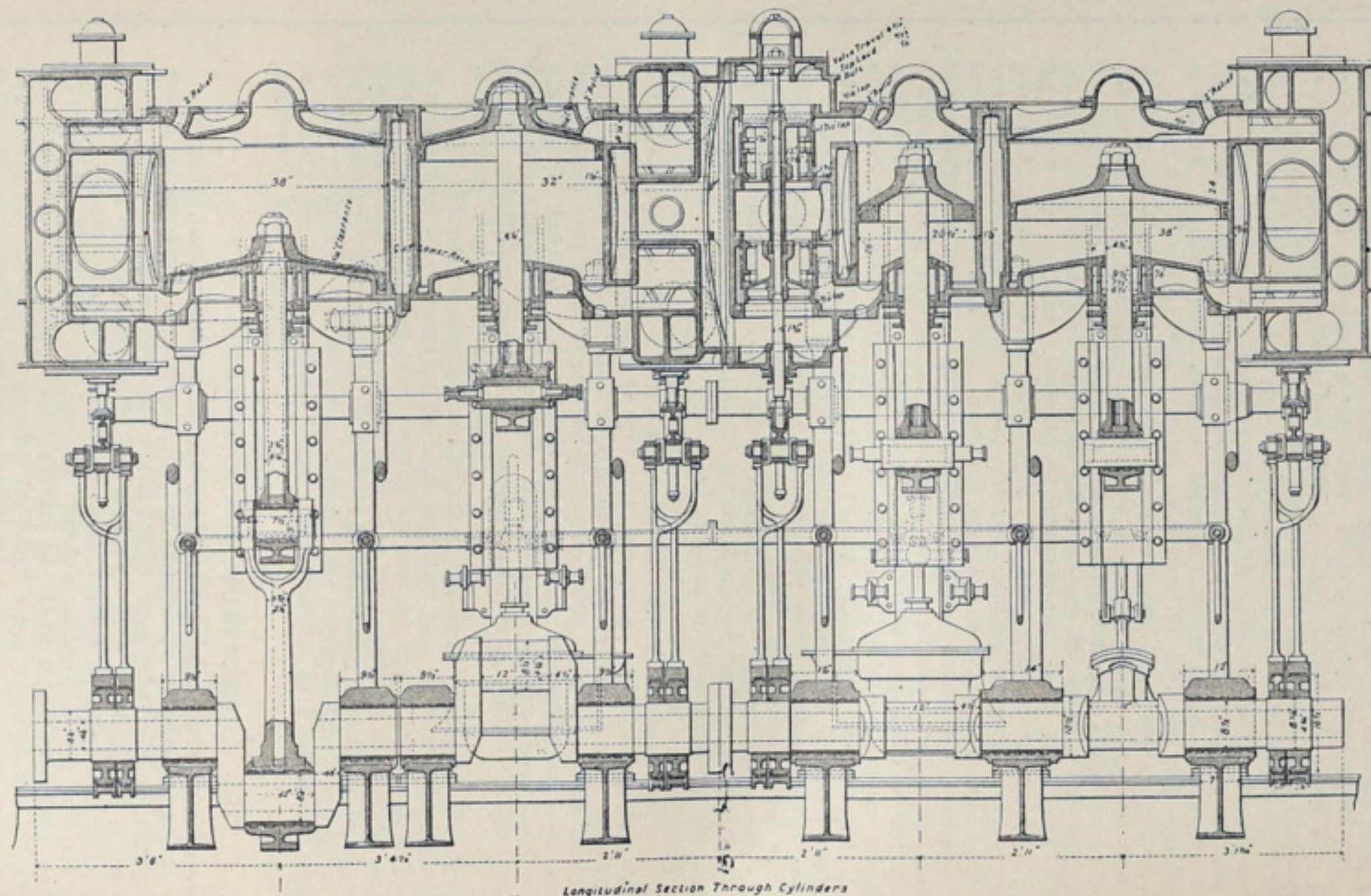
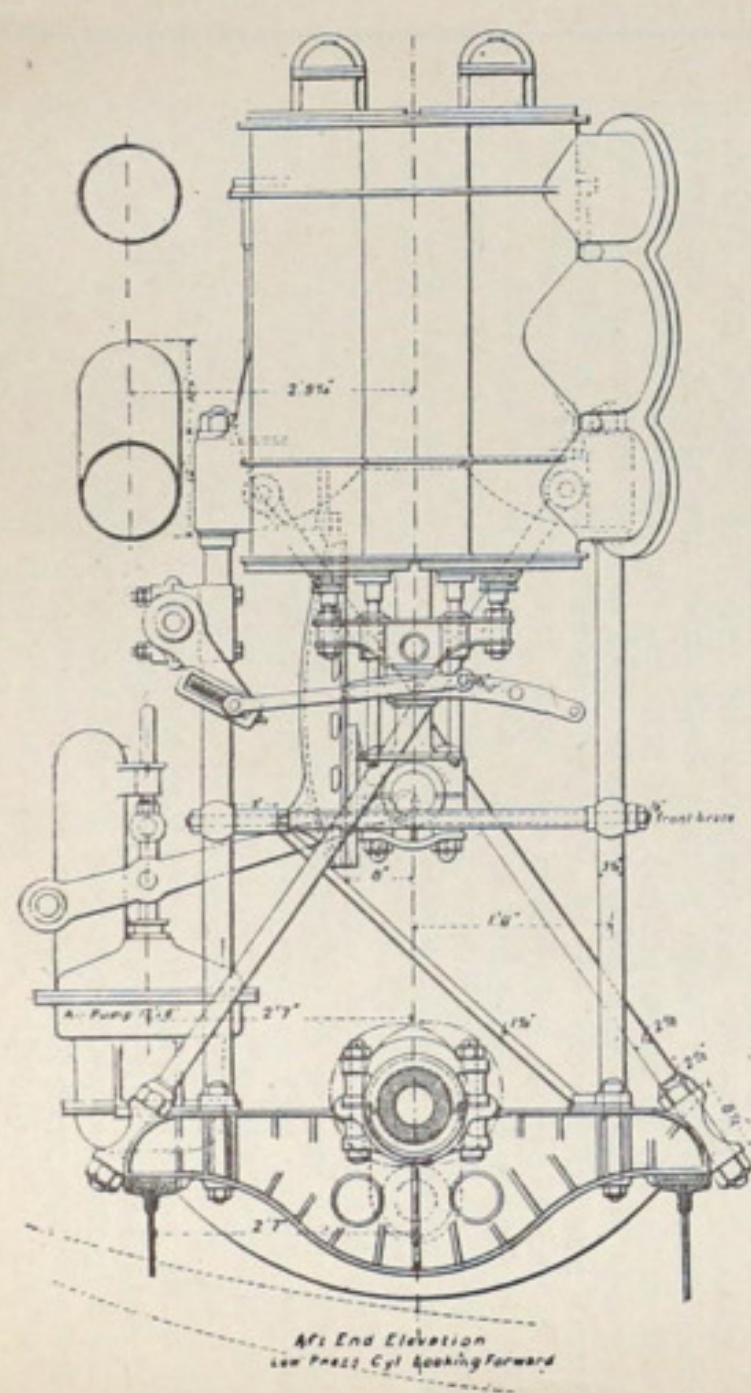
Eight Philadelphia tugs are in a position to claim heavy salvage as a result of assistance rendered to the British steamship Weehawken, bound from Philadelphia to Venice with 1,250,000 gallons of oil in bulk, and which caught fire recently. The tugs succeeded in saving nearly all of her cargo, and it is expected that their bill will amount to fully \$50,000, both cargo and vessel being subject to damages. The vessel is owned by the Standard Oil Co., which carries its own insurance, but the cargo was fully insured.



# NEW TORPEDO BOAT DESTROYERS FOR THE UNITED STATES NAVY.

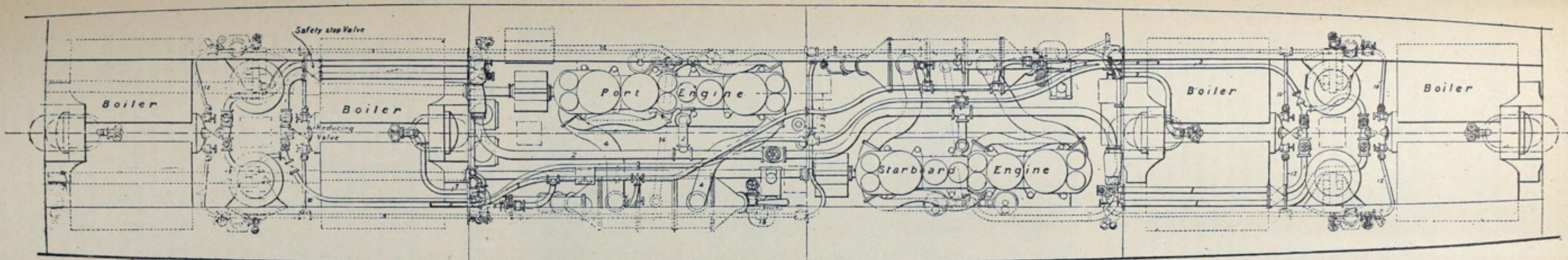


OUTBOARD PLAN OF DESTROYER.

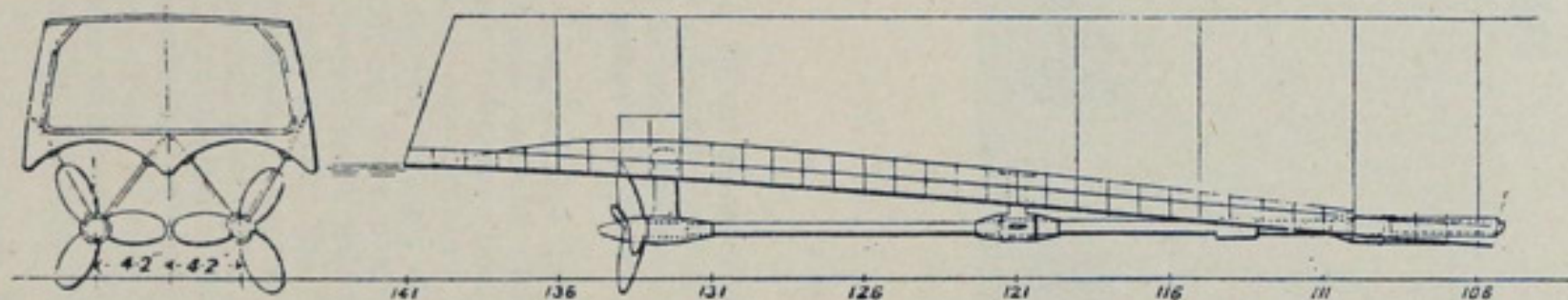


ENGINES FOR THE TORPEDO BOAT DESTROYERS.

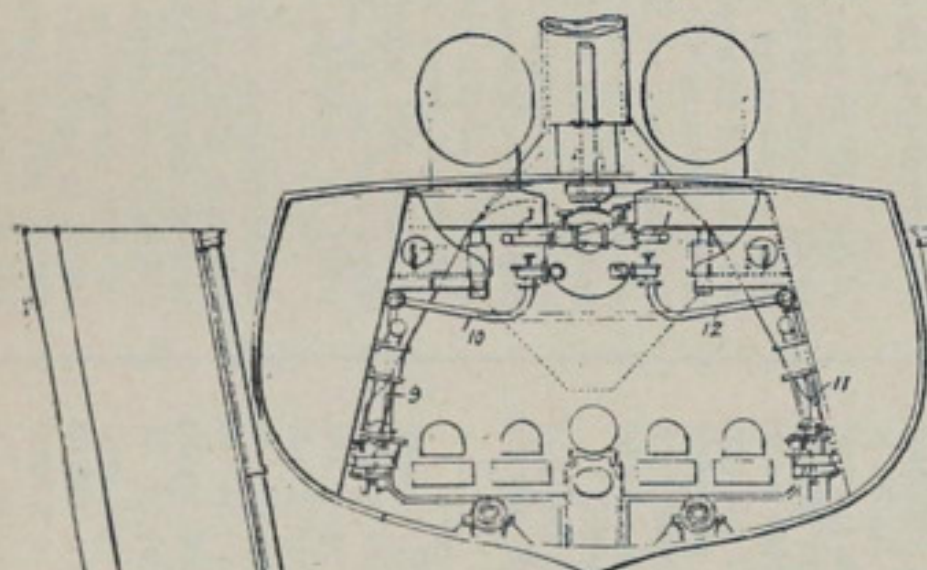
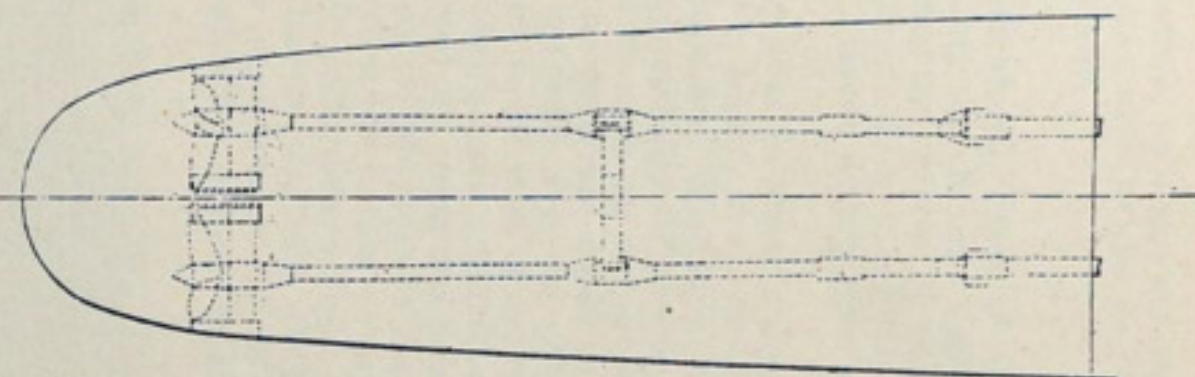




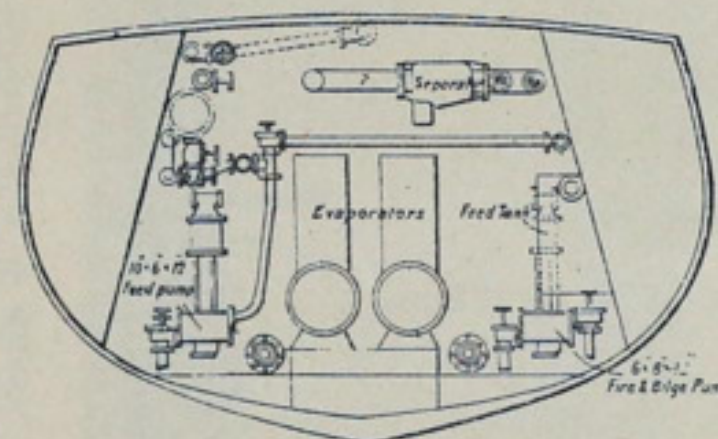
Plan



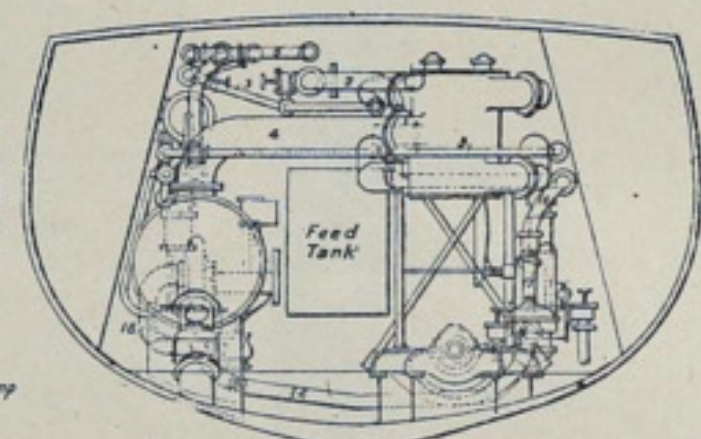
Twin Screw ..... Two Engines  
 Displacement 420 Tons  
 I.H.P. 8000  
 Cylinders 20 1/2, 32, 2-38  
 Stroke 22  
 Revs 327



Section at Frame 97 Looking Aft



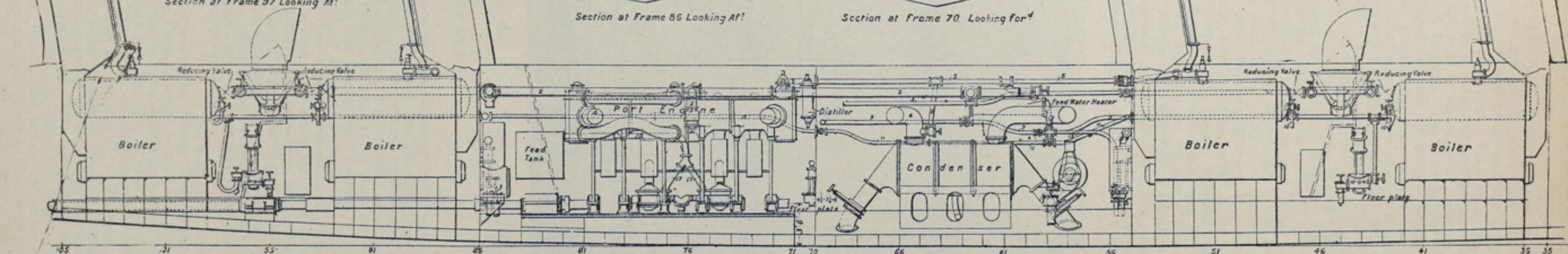
Section at Frame 86 Looking Aft



Section at Frame 70 Looking Aft

Schedule of Pipe System

No.	Description	Size
1	Main steam from Boilers	36"
2	do to Engines	36"
3	Auxiliary steam	16"
4	Main Engine exhaust to Condenser	48"
5	Auxiliary exhaust in engine room	48"
6	do to Fire	36"
7	do to Escape pipe	6"
8	do to Feed water heater	48"
9	Main feed to Boilers	36"
10	do	24"
11	Auxiliary feed do	36"
12	do	24"
13	Main feed pump to Main & Aux feed pipes	36"
14	Air pump suction from Condenser	6"
15	do do	5"
16	do discharge to feed tank	6"
17	do do	5"
18	Bilge injection	7"



Longitudinal Section on Centre Line.



## TORPEDO BOAT DESTROYERS.

DESCRIPTION AND PLANS IN DETAIL OF VESSELS OF THIS CLASS JUST CONTRACTED FOR BY THE UNITED STATES NAVY DEPARTMENT.

As a supplement to this issue of the Review there is presented out-board and inboard plans of the type of construction to be followed in the sixteen torpedo boat destroyers recently contracted for by the government, together with detail drawings of the machinery. For a portion of these drawings the Review is indebted to the courtesy of President William R. Trigg of the W. R. Trigg Co. of Richmond, Va., which has the contract for several of the vessels, and for others to the Engineer of London.

The torpedo boat destroyers will be of about 400 tons displacement, and on trial displacement must not exceed 435 tons. They are to have twin screws; vertical engines, to be placed in separate water-tight compartments, each with a condenser; water tubular boilers, and a bunker capacity for carrying at least 100 tons of coal, affording some protection to engines and boilers. The vessels will be lighted throughout by electricity and furnished with one search-light. They are to be built with good freeboard, good seagoing qualities, and designed to operate at high speed in a sea way. They are to have two conning towers, the forward one of which will be made of  $\frac{1}{2}$ -inch nickel-steel plates. The battery will be composed of seven rapid-firing guns on deck or in conning towers, which, with their mounts and fittings, will weigh about 8 tons. The ammunition required will weigh about 7 tons. There will be mounted on the midship line two 20-foot torpedo tubes to carry 17-foot torpedoes, weighing in all 4 tons, and a space below will be required for stowing the two spare torpedoes and four war heads. Total ordnance weights will amount to about 24 tons. Berthing space will be required to accommodate a crew of sixty men and four officers, and provision space for twenty days. The following weights are to be carried on trial, in addition to completed hull and machinery, and spare parts, with fresh water necessary for trial: Ordnance, 15 gross tons; coal, 25 tons; crew, stores, equipments, etc., 12 tons; in all, 52 tons. If, on trial, the average speed of the torpedo boat destroyers for the two hours' trial falls below the speed guaranteed by the bidder, it may be accepted by the department at a reduction at the rate of \$8,000 for each quarter of a knot. If the speed falls below 28 knots, the vessel will be rejected.

The propelling engines will be alike and each will be placed in a separate water-tight compartment. These engines will be of the vertical inverted-cylinder, direct-acting, triple-expansion type, each with a high pressure cylinder  $20\frac{1}{2}$  inches in diameter, an intermediate pressure cylinder 32 inches in diameter, and two low pressure cylinders each 38 inches in diameter; the stroke of all pistons being 22 inches. The indicated horse power of propelling engines will be about 8,000 when the engines are making about 327 revolutions per minute, the steam pressure at the engines being 250 pounds per square inch above atmosphere. The order of cylinders will be as follows, beginning forward: For the starboard engine, second low pressure, intermediate, high, and first low pressure; for the port engine, first low pressure, high, intermediate, second low pressure. The cranks will be at 90 degrees, the high and first low pressure cranks being opposite, as also the intermediate and second low pressure, the second pair being at right angles with the first pair. The weights of the pistons will be such as to make the weights of reciprocating parts the same for all cylinders, the weights of the air pump pistons and moving parts actuating them being taken into consideration. All the main valves will be piston valves, double-ported for steam, there being one for each high pressure, two for each intermediate pressure, and two for each low pressure cylinder. Each main piston will have one piston rod, with a crosshead working in a slipper guide. The framing of the engines will consist of vertical forged-steel columns, well stayed by diagonal braces. The engine bed plates will consist of a separate steel casting for each bearing, all supported upon and bolted to two fore-and-aft plates, which latter are supported by and form part of the engine keelsons, carefully and strongly worked into the framing of the vessel. The crank shafts will be made in two sections, and will be hollow. The shafts, piston rods, connecting rods, and working parts generally, will be forged of high-grade steel. There will be two condensers, made entirely of composition and sheet brass. Each will have a cooling surface of about 3,470 square feet, measured on the outside of the tubes, the water passing through the tubes. For each propelling engine there will be two double-acting vertical air pumps driven from the high and intermediate pressure crossheads. The circulating pumps will be of the centrifugal type, one for each condenser. The propellers will be right and left, of manganese bronze or approved equivalent metal.

There will be four water tube boilers, constructed for a working pressure of 300 pounds per square inch. Two of these boilers will be placed in a water-tight compartment forward of the engines, and the others will be placed in a water-tight compartment aft of the engines. The boilers in the after boiler compartment and the after boiler in the forward compartment will be alike, each containing about 80.5 square feet of grate surface; the forward boiler will not be as wide as the others, and will contain about 73.5 square feet of grate surface, the length of grates not exceeding 7 feet in all the boilers. The total grate surface will be at least 315 square feet, and the total heating surface at least 17,768 square feet. There will be four smoke pipes, one for each boiler; four main feed pumps, each of a rated capacity of about 150 gallons per minute; feed pumps will be located, one in each engine room, and one in each fire room. All these pumps will draw from the feed tanks and from the reserve water tanks and will deliver into the main feed pipe. The main feed pumps located in engine rooms will deliver into both the main and the auxiliary feed systems. The main feed pump in the after engine room will draw from the reserve water tanks through a separate pipe. Both main feed pumps in engine rooms will draw from the air pump channel ways. There will be two auxiliary feed pumps, one in each fire room, of the same capacity as the main feed pumps. They will draw from the feed tanks, the reserve water tanks, and the sea, and discharge into the auxiliary feed pipe, into the fire main, and the ash ejectors. There will be in each engine room a fire and bilge pump. These pumps will draw from the bilge, through the auxiliary drain, and from the sea, and deliver overboard and into the fire main. There will be two blowers in each fire room.

Foreign criticism on these designs will in all probability prove to a greater or less extent instructive, and inasmuch as the Engineer of Lon-

don is probably the most distinctive representative of conservative British opinion, American architects and engineers will no doubt be interested in the following comment from that publication:

"The designs, although on the whole excellent, present some features not to be found in English practice, and perhaps open to criticism. The stoke-holds are only about 10 feet, 8 inches long, which seems very short, and will make firing a difficult matter, particularly as there are in each stoke-hold two horizontal overhead fans, which will require a great deal of regulating to make them work in unison and supply sufficient air. The United States designer appears to be ignorant of the fact that these fans will 'pull against each other,' unless they are driven at just the right speeds; so that air may be escaping from the stoke-hold through one, while it is being forced in by the other. The arrangement of cylinders is similar to that used by Schlick, namely, a low-pressure cylinder at either end, and the high pressure and mean pressure in the center. The cranks, however, are placed opposite each other in pairs, no attempt seeming to be made to adopt Schlick's mode of balancing by placing the cranks at different angles. They are all at 90 degrees and 180 degrees. The main bearing girders depend on the hull for their longitudinal connection, as there are no longitudinal girders. In this respect both destroyers and torpedo boats agree, and there is the same elaborate system of trussing used to stiffen the engines. Link motions and steam reversing gear are also similar to the torpedo boats, namely, double bar links and direct steam starting gear. This system is also coming into force in England.

"There are two vertical air pumps to each set of engines worked by ordinary levers and links of the high pressure and mean pressure cross-heads. These pumps are double-acting, on the same plan as adopted in the torpedo boats. The suction orifices are in the center of length of the barrels. The very deep pistons or buckets work up and down across the suction ports, each end of the pump thus forming an 'Edwards' or 'Darkes' air pump. The upper half of the pump has a set of vertical valve washers, and the lower half a set of inverted valve washers. We must await trials before judging the merits of this peculiar pump arrangement, as we are not aware that the Edwards air pump has yet been fitted to such high-speed engines. There does not seem to be anything special about the surface condensers; they have each their own centrifugal circulating pump. We may say of the general arrangement of machinery and boilers of these destroyers that although taking up a great length in the vessel, there are compensating advantages, namely, capital subdivision by water-tight bulkheads; short steam pipes to connect the boilers to engines; the engines are each in a separate water-tight division, without the danger to stability of a longitudinal water-tight bulkhead. The stern of the vessel seems to be quite on Messrs. Thornycroft's plans, although there do not seem to be twin rudders, but only one on the center line."

## THE GAIN IN SHIP BUILDING.

That the tonnage constructed during the present year will show a tremendous increase in the case of almost every ship building country in the world becomes more and more apparent as the close of the twelve months approaches. In this connection there is significance in the amount of tonnage under construction in September of this year as compared with that on the stocks at the same time last year. According to the best obtainable figures this was as follows:

COUNTRY.	NO.	TONS Sept. '98	TONS Sept. '97
Great Britain .....	54	175,814	145,436
Germany .....	45	144,105	80,488
France .....	25	75,432	52,089
United States .....	50	58,545	9,800
Italy .....	17	40,984	28,596
Norway .....	26	27,810	14,626
Holland .....	22	20,223	27,585
Denmark .....	15	12,570	10,305
Japan .....	3	10,000	3,300
Austro-Hungary .....	9	9,540	700
Belgium .....	1	4,000	.....
Totals .....	267	579,023	372,919

It will be seen that the increase in the case of the United States is greater, proportionately, than that of any other country with the exception of the two final nations on the list, whose ship building operations are insignificant.

## IMPORTANT QUESTION OF FUEL ECONOMY.

"Some of our competitors may differ with us as to claims regarding fuel economy in Howden hot draft," says a representative of the Dry Dock Engine Works of Detroit, "but it would certainly seem that the whole world is not going wrong in this matter. A copy of the Engineer of London, which we received a few days ago, announces that James Howden & Co of Glasgow have double the amount of work on hand that they had at this time a year ago and have produced to date installations of their apparatus represented by the prodigious figure of 2,250,000 indicated horse power. This is exclusive of more than 72,000 horse power represented in the ships which we have equipped on the lakes. James Howden & Co., who have for some years past devoted themselves entirely to the producing of this apparatus, have recently erected new works in Glasgow, with everything on the latest and most approved principles. The machinery, which is all of the newest type, is largely of American make. All of their old machine tools have been disposed of to firms engaged in regular lines of marine engineering and boiler making, some of them going to Germany.

"Now that there is a place for the ship of medium capacity on the lakes, we are finding vessel owners more anxious to take up with us the question of reducing fuel bills on this class of vessels, which were built when economy in operating expenses was not the important question that it is at present. The use of Howden draft is of especial advantage in this kind of ship, which has been benefitted by the recent transfer of a large fleet to the Atlantic seaboard."

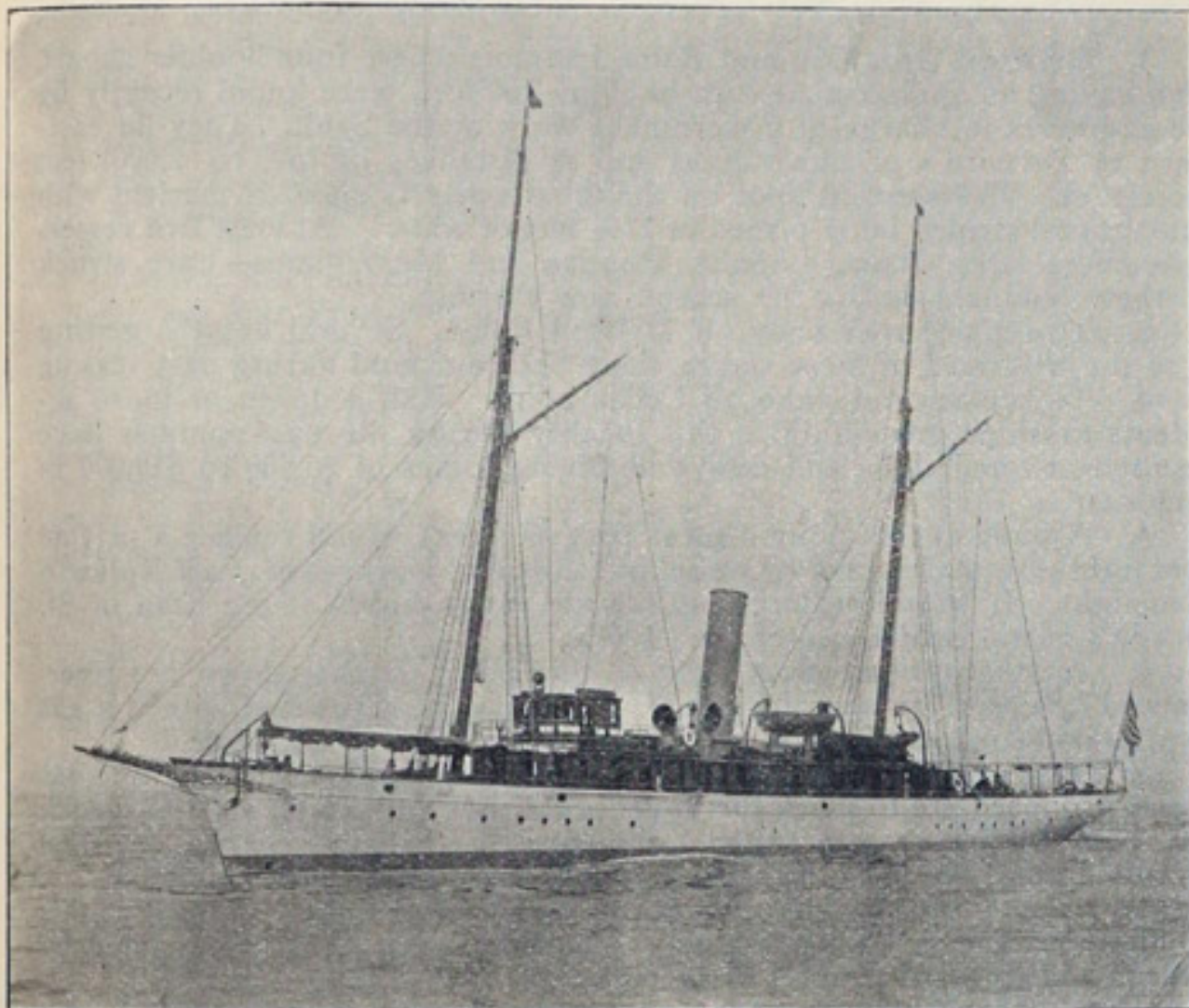


## CRUISER WASP.

THIS FAMOUS VESSEL OF THE AUXILIARY FLEET, FORMERLY THE STEAM YACHT COLUMBIA, IS LIKELY TO BE STATIONED AT CHICAGO.—PRICES PAID FOR AUXILIARY NAVAL VESSELS.

The report emanating from Washington to the effect that Secretary Long of the navy department has assigned the auxiliary gunboat Wasp to duty at Chicago as a training vessel for the naval militia of Illinois, is of especial interest to naval officers and vesselmen on account of the circumstances under which the Wasp, formerly the steam yacht Columbia, was built, and for the reason also that her achievements have been such as to make her one of the most interesting vessels of her craft afloat.

For the two years previous to 1893 the Wm. Cramp & Sons Ship & Engine Building Co. of Philadelphia had, by reason of a pressure of naval and commercial work, declined all proposals for the construction of steam yachts, but in the year mentioned J. Harvey Ladew of New York, submitted to the Philadelphia firm a request that they construct for him the fastest pleasure vessel afloat. The result was the Columbia. She is a steel schooner-rigged vessel, 204½ feet over all, 189 feet on the water line, 23 feet beam and 14 feet depth of hold. She is of 380 tons burden and is



AUXILIARY GUNBOAT WASP, FORMERLY STEAM YACHT COLUMBIA.

fitted with a four-cylinder triple expansion engine, with cylinders 21½, 31, 44 and 44 inches diameter and 20 inches stroke, steam being applied by two single-ender, return-tube boilers 12 feet 2 inches in diameter by 11 feet 5 inches long, with a working pressure of 160 pounds, the machinery developing under forced draft a maximum of 1,900 indicated horse power. Relative to the displacement and draught of the vessel there seems to be a discrepancy in the details furnished from different sources. In the case of the latter particular this is at present a highly important matter, in view of the fact that definite determination as to whether the vessel will go to Chicago seems to rest on the question of whether her draught will enable her to pass through the canals. The navy register lists the auxiliary gunboat Wasp as of 400 tons displacement and 12½ feet draught, but details furnished to the Review by the Cramp company fix her displacement at 526 tons on a mean draught (cruising trim) of 10¾ feet, with the comment that her best racing draught would probably not exceed 9½ feet with a displacement at racing draught of 436 tons.

The Columbia made a most remarkable showing during her trial. She steamed over a course 80.52 knots in length at a mean speed of 17.85 knots, equal to 20.53 statute miles per hour. At one part of the run for a distance of 22 knots her speed was 18.35 knots. This was due to deep water in that part of the course, the depth in other parts not being sufficient to prevent dragging to some extent. At a mean speed of 18 knots this vessel requires a depth of water at least fifteen times her own draught to avoid dragging. She was promptly accepted by her owner and naturally the Cramps were elated by the fact that the record of the trial placed the Columbia at the head of the list of sea-going pleasure steam craft in the world for sustained speed.

The conversion of the Columbia to the auxiliary cruiser Wasp took place at the Brooklyn navy yard and her armament consists of four 6-pounder rapid firers and two Colts, her complement while in service being five officers and fifty-one men. Should the draught of the Wasp prevent her selection for the Chicago service it is probable that the selection will fall to the Frolic, formerly the yacht Comanche, which was taken to the seaboard from the great lakes after the declaration of war. The Comanche is 186 feet over all, 165 feet water line, 25 feet beam, 14 feet depth of hold and 11 feet draught. She was built by the Globe Iron Works Co., Cleveland, and was purchased from Mr. H. M. Hanna, president of the company.

In connection with this inference to vessels of the auxiliary fleet, interest attaches to the custom house records filed this week, which show the prices paid for a portion of the vessels of the fleet, purchased during the war. They are as follows: Steamships El Sol, El Rio, El Norte and El Sud, all Morgan liners, \$575,000 each; steamship John Englis, \$450,000, Maine Steamship Co.; steamship Creole, \$40,000, Cromwell Line; steamship Yorktown, \$475,000, Old Dominion Steamship Co.; steamship Niagara, \$200,000, New York & Cuba Main Steamship Co.; steamship Me-

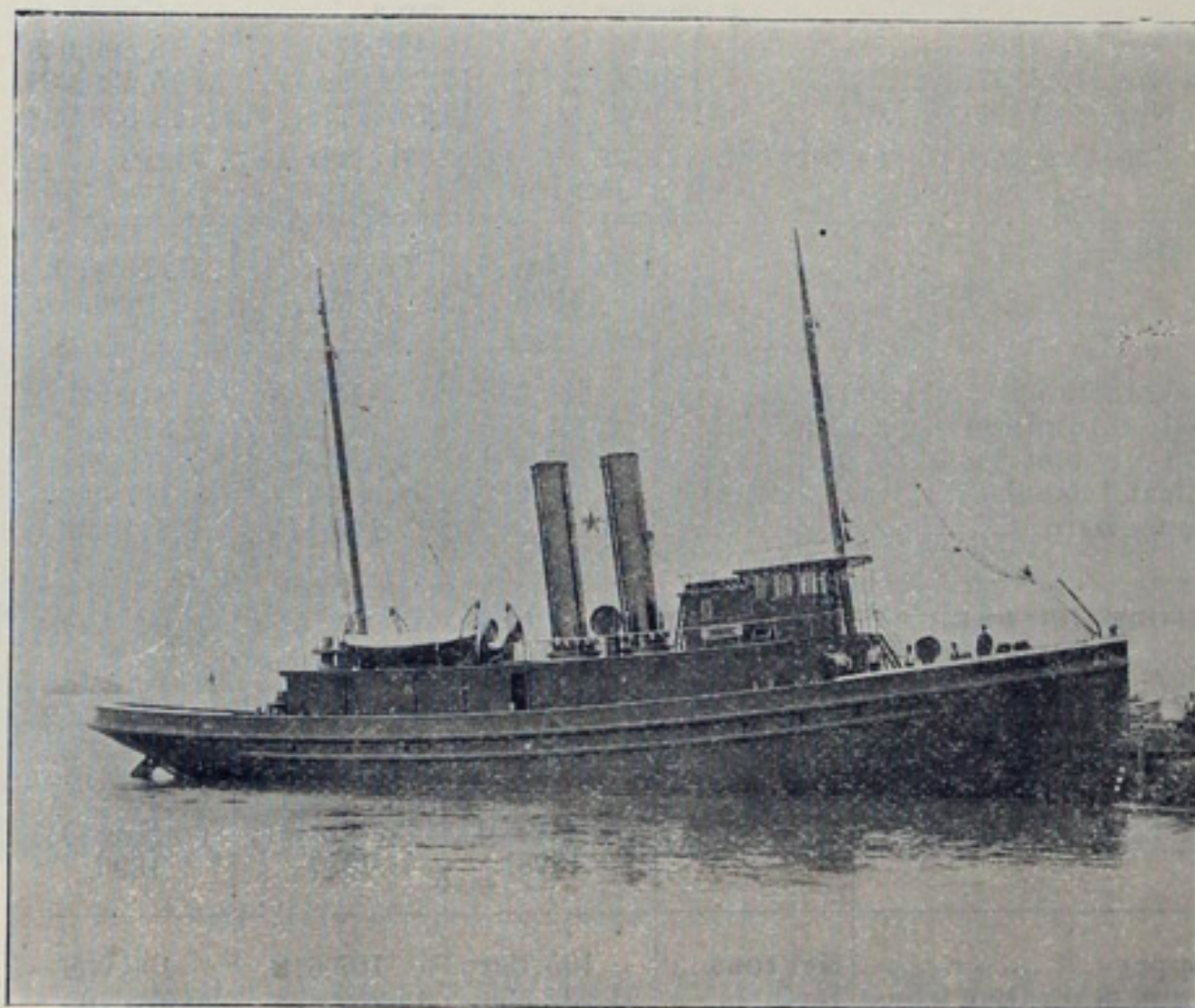
nemsha, \$145,000, Miami Steamship Co.; steamship Nictheroy, \$575,000, Charles R. Flint, steamship Merrimac, \$342,000, Miami Steamship Co.; steamship Alice, \$19,000, J. M. Worth & Co.; tug El Toro, \$40,000, Morgan Line; tug Edgar Luckenbach, \$45,000, Lewis Luckenbach; tug John Dwight, \$25,000, Transfer Co.; tug J. D. Jones, \$55,000, Merritt Wrecking Co.; tug Hercules, \$40,000, Standard Oil Co.; tug Atlas, \$65,000, Standard Oil Co.; tug Walter Luckenbach, \$75,000, L. Luckenbach; tug Right Arm, \$30,000, Merritt & Chapman Wrecking Co.; yacht Kanawha, \$50,000, J. P. Duncan; yacht Sovereign, \$300,000, M. C. Borden; yacht Shearwater, \$26,000, H. R. Wolcott; yacht Stranger, \$75,000, M. Lewis; yacht Thespia, \$65,000, T. Dows; yacht Viking, \$30,000, H. A. Hutchings; yacht Elfrida, \$5,000, W. Seward Webb; yacht Almy, \$110,000, Fred Gallatin; yacht Alicia, \$117,500, H. M. Flagler; yacht Alleen, \$55,000, R. Stevens; yacht Corsair, \$225,000, Pierrepont Morgan.

## POWERFUL TUG BOATS.

THE HILLMAN SHIP AND ENGINE BUILDING CO. OF PHILADELPHIA IS BUILDING A FLEET OF THEM FOR THE STAPLES COAL CO.

The growth of the coastwise movement of coal by vessel on the Atlantic seaboard and the constant effort for a better solution of the problem of large tows has exerted many influences, which have resulted naturally in improvements and innovations. One factor wherein this demand for improvement and enhanced power has been met most adequately is found in the construction of the seagoing tugs designed to tow the barges engaged in this coal trade. The exigencies of the case have resulted in the construction, during the past few years, of quite a number of first-class towing steamers. Modern development along this line is, however, best represented by a fleet of six vessels, the last of which the Hillman Ship & Engine Building Co. of Philadelphia will, ere long, be ready to deliver to the Staples Coal Co. of Taunton, Mass.

The vessels are almost identical in every respect and are 140 feet in length, 26 feet 4 inches beam and 16 feet 3 inches depth, with a draught of 12 feet. Each of them is fitted with triple expansion engines capable of developing a speed exceeding 14 miles per hour. The picture presented herewith is the Waltham, the third tug of the present contract for four,



TUG WALTHAM, BUILT BY THE HILLMAN SHIP ENGINE BUILDING CO.

on which the Hillman company is at work. The Eureka, which was the first to leave the yard, has been in commission for several months; the Concord went into service a few weeks ago, while work on the fourth vessel is well under way. The Hillman company has built in all six towing vessels for the Staples company, one of the number being the Winthrop, now the Oceola of the United States naval auxiliary fleet. As may be imagined from the general appearance, the vessels are very staunch and of considerable power.

The General Electric Co., New York, has submitted to the board of construction of the navy department a proposition which contemplates the installation of the electric system on the battleships Alabama, Illinois and Wisconsin for operating all auxiliaries, instead of the turrets only, as now proposed. The Kearsarge and the Kentucky are equipped with electrical gear for nearly all purposes except steering, for which steam is used. The system to be used on the Maine, Missouri and Ohio has not yet been determined, but will probably be electricity for all auxiliaries. Rear Admiral Schley reported that in the battle of July 3 the turrets controlled by electricity did better and quicker work and were not so hot as those functioned by steam.

The Buffalo Fish Co. will raise the steamer Jones, sunk some weeks ago. Diver Alexander Zess of Sault Ste. Marie made the preliminary examination and recovered \$1,500 in bills from the vessel. Mr. Zess has been very successful in diving operations in the vicinity of the Sault.

E. B. Sheffer, purchasing agent of the Erie Railroad Co., 21 Cortlandt street, New York, announces that J. W. Platten has been appointed assistant purchasing agent.



## SHORTAGE IN NORTHWESTERN GRAIN.

SHIPMENTS THROUGH CANALS AT THE SAULT ARE NOT EQUAL TO THOSE OF A YEAR AGO, BUT THE GENERAL VOLUME OF LAKE SUPERIOR BUSINESS IS VERY HEAVY.

A striking feature of reports of Lake Superior commerce to Nov. 1 is the shortage in grain and flour shipments as compared with last year. This is in part an explanation of the slump that has occurred in lake freights within the past fortnight. It would seem that lake vessel men have reason, for the present at least, to thank the Chicago corn movement more so than the northwestern wheat crop for profit in the carrying trade. On Nov. 1, 1897, the wheat movement through the canals at the Sault aggregated 41,284,043 bushels; on Nov. 1 of this year the aggregate is only 36,505,272 bushels. Flour shipments through the canals to Nov. 1, 1897, were also greater than they are this year by more than 1,000,000 barrels. The figures are 7,145,141 barrels to Nov. 1, 1897, against 6,113,966 barrels to Nov. 1, 1898. In grain other than wheat there is an increase this year, but the amount is not of course, sufficient to make up for the loss in wheat and flour. The figures are 21,227,335 bushels of grain other than wheat to Nov. 1, 1898, against 16,259,878 bushels to Nov. 1, 1897.

But this does not mean that there is any falling off in the general movement of freight through the canals. The canal commerce of 1898 will again surpass all previous records. It will very probably exceed 21,000,000 net tons. The total freight movement to Nov. 1 is 18,509,048 net tons carried in 15,775 vessels (passages) of 16,426,472 registered tons. On Nov. 1, 1897, the number of tons of freight was 15,629,382; registered tonnage, 15,788,994; passages, 15,355. The excess of freight tons over registered tons is due, of course, to larger vessels and deeper draft in the Lake Superior trade. This difference will be even more noticeable next year.

The soft coal movement is another interesting feature of these reports. Soft coal shipments to all Lake Superior ports this season will exceed 3,000,000 tons. This is some 700,000 tons in excess of any previous year. Shipments to Nov. 1 are 2,850,376 tons, against 1,752,283 tons on Nov. 1 a year ago (just following strike period), and 2,315,437 tons on Nov. 1, 1896. In the following tables the reports of both canals at the Sault to Nov. 1 are combined and compared with reports on the same date in the past two years:

	VESSEL PASSAGES.	REGISTERED TONS.	FREIGHT TONS.
To Nov. 1, 1898.....	15,775	16,426,472	18,509,048
To Nov. 1, 1897.....	15,355	15,788,994	15,629,382
To Nov. 1, 1896.....	17,053	15,787,927	14,539,968

## MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To Nov. 1, 1898.	To Nov. 1, 1897.	To Nov. 1, 1896.
Coal, anthracite, net tons.....	438,083	444,258	349,929
Coal, bituminous, net tons.....	2,850,376	1,752,283	2,315,437
Iron ore, net tons.....	10,834,454	9,879,341	7,459,264
Wheat, bushels.....	36,505,272	41,284,034	52,107,888
Flour, barrels.....	6,113,966	7,145,141	6,841,632

## REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO NOV. 1 OF EACH YEAR FOR THREE YEARS PAST.

## EAST BOUND.

ITEMS.	Designation.	To Nov. 1, 1898.	To Nov. 1, 1897.	To Nov. 1, 1896.
Copper .....	Net tons....	105,180	107,612	106,038
Grain, other than wheat .....	Bushels....	21,227,335	16,259,878	20,973,705
Building stone .....	Net tons....	4,670	6,249	17,194
Flour .....	Barrels.....	6,113,039	7,144,856	6,841,345
Iron ore .....	Net tons....	10,834,454	9,879,341	7,459,264
Iron, pig .....	Net tons....	32,267	11,047	21,631
Lumber .....	M. ft. b. m.	799,491	715,529	631,982
Silver ore.....	Net tons....	.....	5	240
Wheat .....	Bushels....	36,505,272	41,284,034	52,107,888
Unclassified freight .....	Net tons....	198,600	198,606	157,357
Passengers.....	Number....	19,616	18,859	18,197

## WEST BOUND.

ITEMS.	Designation.	To Nov. 1, 1898.	To Nov. 1, 1897.	To Nov. 1, 1896.
Coal, anthracite.....	Net tons....	438,034	444,258	349,929
Coal, bituminous.....	Net tons....	2,850,376	1,752,283	2,315,437
Flour .....	Barrels .....	927	275	287
Grain .....	Bushels....	26,105	15,100	2,209
Manufactured iron.....	Net tons....	189,219	104,204	79,850
Salt .....	Barrels .....	229,681	210,397	205,636
Unclassified freight.....	Net tons....	337,575	308,177	285,464
Passengers.....	Number .....	22,840	20,617	18,503

## SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Nov. 1, 1898.	To Nov. 1, 1897.	To Nov. 1, 1896.
West bound freight of all kinds, net tons.....	3,848,122	2,350,282	3,067,519
East bound freight of all kinds, net tons.....	14,660,926	13,279,100	11,472,449
	18,509,048	15,629,382	14,539,968

The total number of vessel passages to Nov. 1, 1898, was 15,775 and the registered tonnage 16,426,472.

## WHERE LIGHTED BUOYS ARE WANTED.

OFFICIALS OF THE LAKE CARRIERS' ASSOCIATION AGAIN TAKE UP THE SUBJECT WITH THE UNITED STATES LIGHT-HOUSE BOARD.

Secretary Keep and Treasurer McKay of the Lake Carriers' Association, are still hoping that the executive officers of the United States light-house board will so arrange their plans regarding light-house tenders and other facilities for the care of gas buoys on the lakes that an additional supply of these valuable aids to navigation will be available when navigation opens next spring. All plans for a tender especially fitted for this purpose are abandoned for the present season, but it will be the policy of the vessel owners to do all in their power to assist the light-house officials in securing appropriations sufficient from the next congress to treat the lakes liberally in this matter next season, on account of the especial value of the buoys under such conditions of navigation as prevail on the lakes. There are probably fifty or more points where additional gas buoys could be used to great advantage. Twenty of these locations (the most urgent of them, and principally on the Sault river) were designated recently by Capt. McKay for Secretary Keep, who is in correspondence with the Washington officials on the subject. The following notes were accompanied by charts on which corresponding numbers were used to designate the several points where buoys are proposed:

## POINTS ON THE ST. MARY'S RIVER IN URGENT NEED OF LIGHTED BUOYS.

1. Between Gros Cap and Point Iroquois where four boulder shoals, each having an approximate area of 50 by 150 feet, were found recently by the engineers in charge of government work at the Sault. They lie eastward of Bernard's private ranges and at distances of 750 to 2,000 feet therefrom. The shoalest spot on the most westerly shoal is marked with a horizontal striped buoy placed in 17½ feet of water. At least five vessels—steamers Alva, Italia, LaSalle, Pontiac and McWilliams—have struck on these boulders during the season now closing.

2. To replace spar buoy off Mission Point. Several vessels, getting in to the westward of these stakes, have been aground during past season.

3. To replace red stake off Cedar point. Half a dozen or more accidents to ships grounding in this locality during the past summer have resulted in repair bills and delays involving losses of \$5,000 to \$10,000 in each case.

4. A buoy at this point (lower part of river) would replace a private float light now maintained by vessel interests and marked on chart Roleau's float light. It would replace also private range lights at the head of St. Joseph's island, which center the "Dyke."

5. Another private float light at this point, farther down the river marked "Roleau" (name of keeper) would also be dispensed with if a gas buoy was available. This is what is known as the "Dark Hole."

6, 7, 8, 9. This is the new cut at Sailors' Encampment. The four gas buoys proposed are to mark the upper and lower ends of this 300-foot rock cut, both sides. Private range lights on St. Joseph's island, marked "Rains' lights" could be dispensed with if these buoys were available.

10. This is the turning point at the foot of Mud Lake. A buoy at this point would dispense with two sets of private range lights maintained by Roleau and Bernard (names of keepers).

There are periods of smoky and misty weather when ranges in the upper St. Mary's river—Cedar point government ranges for instance, and Bernard's private ranges, west of Round island—can not be seen for a distance of even a couple of miles, while with gas buoys to be picked up at these points (Nos. 1, 2, and 3) in such conditions of weather, vessels could run the river with safety. The same is true with reference to gas buoy proposed for lower end of Mud Lake. (No. 10).

Ten other places outside of the St. Mary's river where gas buoys are most urgently needed are designated as follows:

1. Gravelly point, opposite Charity island light, Saginaw bay.
2. North point, near Thunder bay island light, Lake Huron.
3. Middle island reef, Lake Huron.
4. St. Martin's reef, Lake Huron.
5. Graham shoals, Straits of Mackinac.
6. Mackinac island spit, off south point, opposite Round island.
7. Vienna shoal, just above Waugoshance, Straits of Mackinac.
8. Major shoal, Straits of Mackinac.
9. Hog island reef, Straits of Mackinac.
10. Drisco shoal, Green bay.

Capt. F. Hoffman of the steel steamer Victory has written Capt. Geo. P. McKay of the Lake Carriers' Association regarding the recent accident to his vessel at Lansing shoal, Lake Michigan. Particulars of this accident are of especial interest to lake vessel masters. Capt. Hoffman says: "When coming through the passage between Squaw island and Lansing shoal on Oct. 20, the Victory struck a rock, which I do not think has more than 15 feet of water over it and as near as I can tell bears S ½ E, about one-half mile, from Lansing shoal gas buoy. The light house books tell us that the gas buoy is moored in 28 feet of water on the southeasterly end of Lansing shoal, and as the night was very dark I thought I was safe in keeping over towards the gas buoy in order to be sure and keep clear of the shoals on the other side of the passage. The Victory sustained very heavy damage. Forty plates had to be taken off the ship's bottom and over half of them had to be replaced with new ones, and ninety frames had to be cut out and renewed. In writing you I thought perhaps something could be done to find this boulder and have it marked, as this passage is used by most all boats trading to Escanaba and other west shore ports during the fall months."

Receipts of coal by lake at Milwaukee to Nov. 1 of this year as compared with the same date in 1897 were as follows: Bituminous to Nov. 1, 1898, 565,013 tons; to Nov. 1, 1897, 457,697 tons; anthracite to Nov. 1, 1898, 619,938 tons; to Nov. 1, 1897, 460,961 tons. It will be noted that the receipts this year are thus far largely in excess of 1897, but it is not probable that the end of the present season will find totals equal to the full season of 1897, as coal in immense quantities was rushed to Milwaukee after the strike in the mining regions last fall, the receipts after Nov. 1 aggregating 312,515 tons of bituminous and 180,574 tons of anthracite.



## CAR FERRY SOLANO.

A CRAFT CAPABLE OF MOVING FORTY-EIGHT CARS OF ORDINARY TYPE OR TWENTY-FOUR PASSENGER COACHES OF THE LARGEST CLASS.

Through the kindness of General Passenger Agent T. H. Goodman of the Southern Pacific Co., San Francisco, Cal., the Review is enabled to present herewith a picture of that company's car ferry Solano, which is probably the largest craft of its kind in the world. Dimensions and other particulars of this interesting vessel are as follows: Length over all, 424 feet; length on bottom, 406 feet; height at sides, at center, 18 feet 5 inches; at ends, from bottom of boat, 15 feet 10 inches; moulded beam, 64 feet; extreme width over guards, 116 feet; camber, or reverse shear of deck, 2 feet 6 inches; draught, light, 5 feet; draught, loaded, 6 feet 6 inches; registered tonnage, 3541.31. She has two vertical beam engines with cylinders of 60-inch bore and 11 feet stroke, built by the Harlan & Hollingsworth Co., of Wilmington, Del. Wheels are 30 feet diameter, with twenty-four buckets each of 17 feet face.

The engines are driven by eight steel boilers, each 28 feet long and 7 feet diameter, and containing 143 tubes of 4 inches diameter and 16 feet length. The total heating surface of the eight boilers is 19,640 square feet; grate surface, 288 square feet. The boilers are suited to engines of 2,000 horse power each. They are placed in pairs on the guards, forward and abaft the paddle boxes, and are so connected with the engines that one or all may be used at pleasure. Engines of this vessel are not placed abreast of each other. They are placed on the center line of the boat, fore and aft. The distance from center to center of shaft is 16 feet. The object of this arrangement is to give room on deck for four tracks. As each wheel is driven by an independent engine, the boat may be more easily handled in entering slips.

Among other novelties in the construction of the Solano are four Pratt trusses, arranged fore and aft directly under tracks and varied in size to meet the strain upon them. They give longitudinal stiffness, and connect the deck and the bottom of the boat, making her in reality a huge floating bridge. In addition there are eleven water tight transverse bulkheads, dividing the hull into twelve compartments and rendering it secure from sinking, beside giving additional stiffness. There are four balanced rudders at each end of this immense craft. These are each 11½ feet long by 5½ feet deep. They are coupled together and worked by hydraulic steering gear, which is operated by independent steam engines and pumps. The steering gear is connected also with steering wheels in the ordinary manner. The pilot houses are 40 feet above deck and the helmsman is therefore afforded a clear view fore and aft. For the purpose of connecting the pilot houses there are four bridges running athwartship and another fore and aft connecting the two ends of the ship.

Upon the deck of the vessel are four tracks extending the entire length, with capacity for forty-eight cars with locomotive, or twenty-four passenger coaches of the largest class. The aprons connecting the boat with the slips at Benicia and Port Costa are each 100 feet long, bearing four tracks and so arranged that freight and passenger trains are run aboard without being uncoupled from locomotives. The aprons weigh 150 tons each and are worked by a combination of pontoons and counterweights by hydraulic power. In the hold of the boat are commodious quarters for the officers and crew, and on deck rooms for the transaction of railroad business.

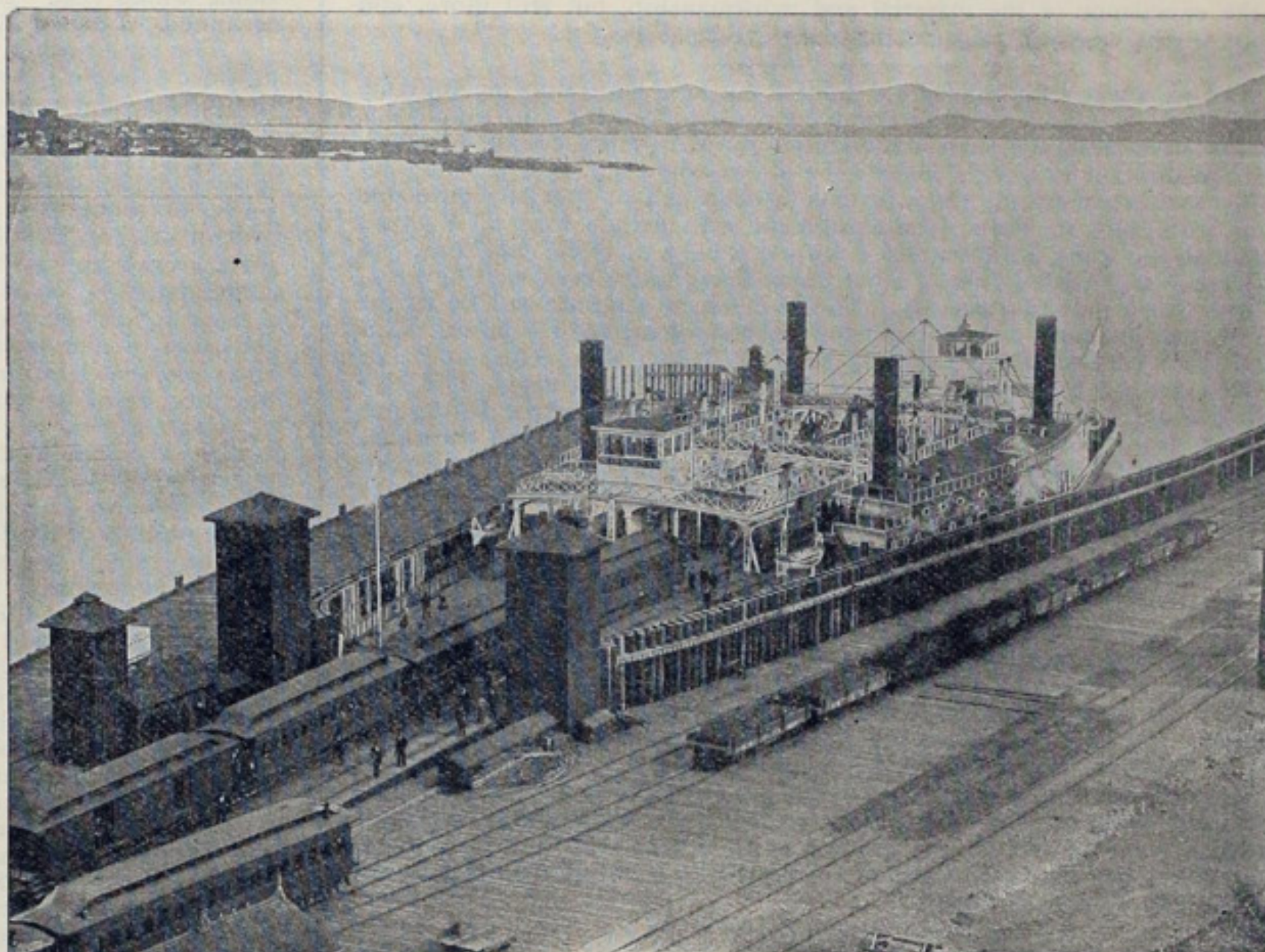
## BESSEMER CONTRACTS—LAKE SHIP YARD MATTERS.

The Bessemer Steamship Co. of Cleveland (John D. Rockefeller) has contracted with the Globe Iron Works Co. for a steel freight steamer, that is to be a duplicate of the steamer Morse of the Bessemer fleet, and with the American Steel Barge Co. of West Superior, Wis., for a steel tow barge, that is to be in most respects a duplicate of the tow barge Roebling, also of the Bessemer fleet. The Morse and Roebling, completed at West Bay City, Mich., within the past summer, are the largest ships on the lakes, so that the new vessels will also be in the front rank of big freighters. The new steamer is to be in all respects (save a few minor details) a duplicate of the Morse—quadruple expansion engines, steel forgings, Scotch boilers. The new barge will be 465 feet over all, or 10 feet longer than the Roebling. She will also have 30 feet moulded depth, as against 28½ feet in the Roebling. On 17 feet 4 inches draught the Roebling has moved even 7,000 gross tons of ore, and it is expected therefore that the new barge will carry about 7,750 gross tons on 17 feet 6 inches draught. Nothing is said about more contracts, but it is thought that an order for another tow barge will be placed by the same company for late delivery, probably August next. This is, however, only a guess. The steamer and consort just ordered are not to be delivered until some time after the opening of navigation next season.

It is expected that a meeting of directors of the American Steel Barge Co. will be held in a few days and that following this meeting the new dry dock at the West Superior ship yard, upon which work was begun some time ago, will be rapidly pushed to completion. Only a start has been made on this dock as yet, but it will undoubtedly be gotten ready for service some time next season, as dock work at the West Superior plant has been decidedly profitable. As many as eleven ships have been turned away from West Superior during the past summer, on account of the inability of the barge company to provide for them in the one dock at their plant. The new dock is to be 680 feet long on the keel blocks, 65 feet wide at the

bottom and 118 feet at top, with a 65-foot gate. There will be 22 feet of water over the sill. Supt. Ford of the barge company was in Cleveland a few days ago. He was quite confident of securing two or three large steel vessels to build during the coming winter, in view of negotiations under way with several vessel owners. It is probable also that the West Superior company will have a couple of steel tugs to build. Of late they have been drifting into a variety of structural work other than ship building, and this has proven quite profitable at the head of the lakes. Work of this kind turned out of late includes ten large refuse burners for saw mills, a large number of legs for ore shipping docks and the steel work entering into piers at Duluth. It is also the intention of the company to make arrangements for undertaking an extensive line of bridge work.

In his effort to again secure control of the West Bay City steel ship building plant, F. W. Wheeler is working independent of stockholders of the firm of Wheeler & Co. He says he is confident of gaining possession of the plant by the opening of the new year. His plan is evidently to first raise enough money to buy the bonds on which a first mortgage is held. This would not require a very large sum. Then with assistance from the Bessemer steamship company, which would probably be given to him personally, he hopes to make some sort of a settlement with the numerous supply concerns that hold claims against F. W. Wheeler & Co. and also claims that are in court against the three Bessemer boats lately completed at West Bay City. It is probable that the recent meetings of business men at West Bay City were held with a view to starting the matter of reorganization, more so than from any hope of getting money contributions. If he can buy up the bonds, Mr. Wheeler evidently looks for assur-



SOUTHERN PACIFIC CO.'S CAR FERRY SOLANO.

ance from the Bessemer company that they will allow him to go ahead, notwithstanding their large claims, provided some method is found of disposing of the great number of claims against their ships.

Capt. James Davidson of West Bay City has laid the keel of the second wooden schooner which he will build at his yard this winter. The boats will be duplicates, 336 feet over all, 327 feet keel, 45½ feet beam and 22 feet hold. A steamer may be built at the yard before the opening of navigation next spring.

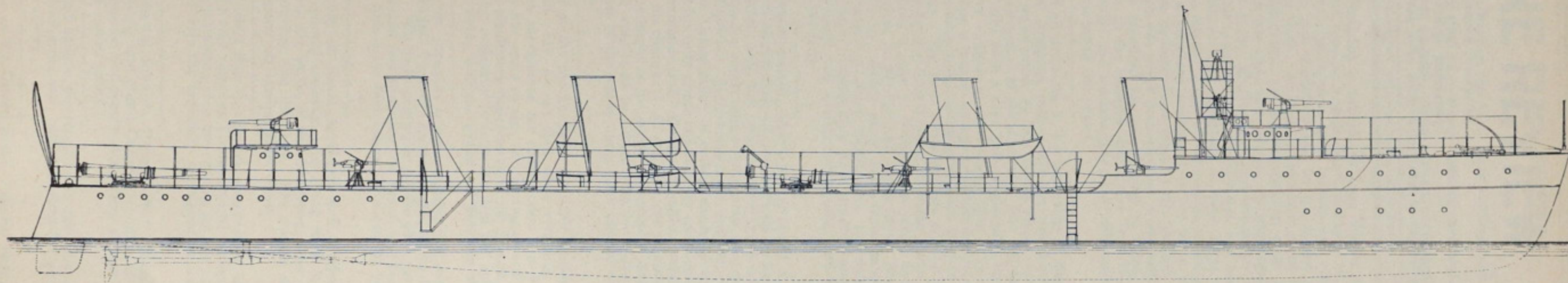
Newspaper dispatches persist in connecting the name of Andrew Carnegie with the New York ship yard enterprise in which W. I. Babcock is named as general manager. The New York project sprung from the suggestion made some time ago by Mr. Carnegie, but he is in no way connected with the company that has been in process of formation for several months past. Mr. Babcock has said nothing on the subject, very probably for the reason that he realizes the great scope of the undertaking and the chances of failure where several millions of capital are required. The location proposed for the ship yard is in a most advantageous part of Staten island. The Wellman-Seaver Co. of Cleveland has been engaged on preliminary engineering work in connection with the enterprise.

Mr. E. J. Shriver is now associated with Mr. F. P. Gordon in the management of affairs of Johnson & Higgins (insurance) in Buffalo. Mr. Gordon has of late been away from Buffalo a great deal and expects to spend the greater part of the coming winter at the headquarters of Johnson & Higgins in New York. "Conditions regarding insurance on the lakes are changing from year to year," Mr. Gordon says. "The coming year will probably bring changes of more importance than anything that has occurred in the past and, although the season of 1898 has not yet closed, we are engaged in getting matters in shape for another year."

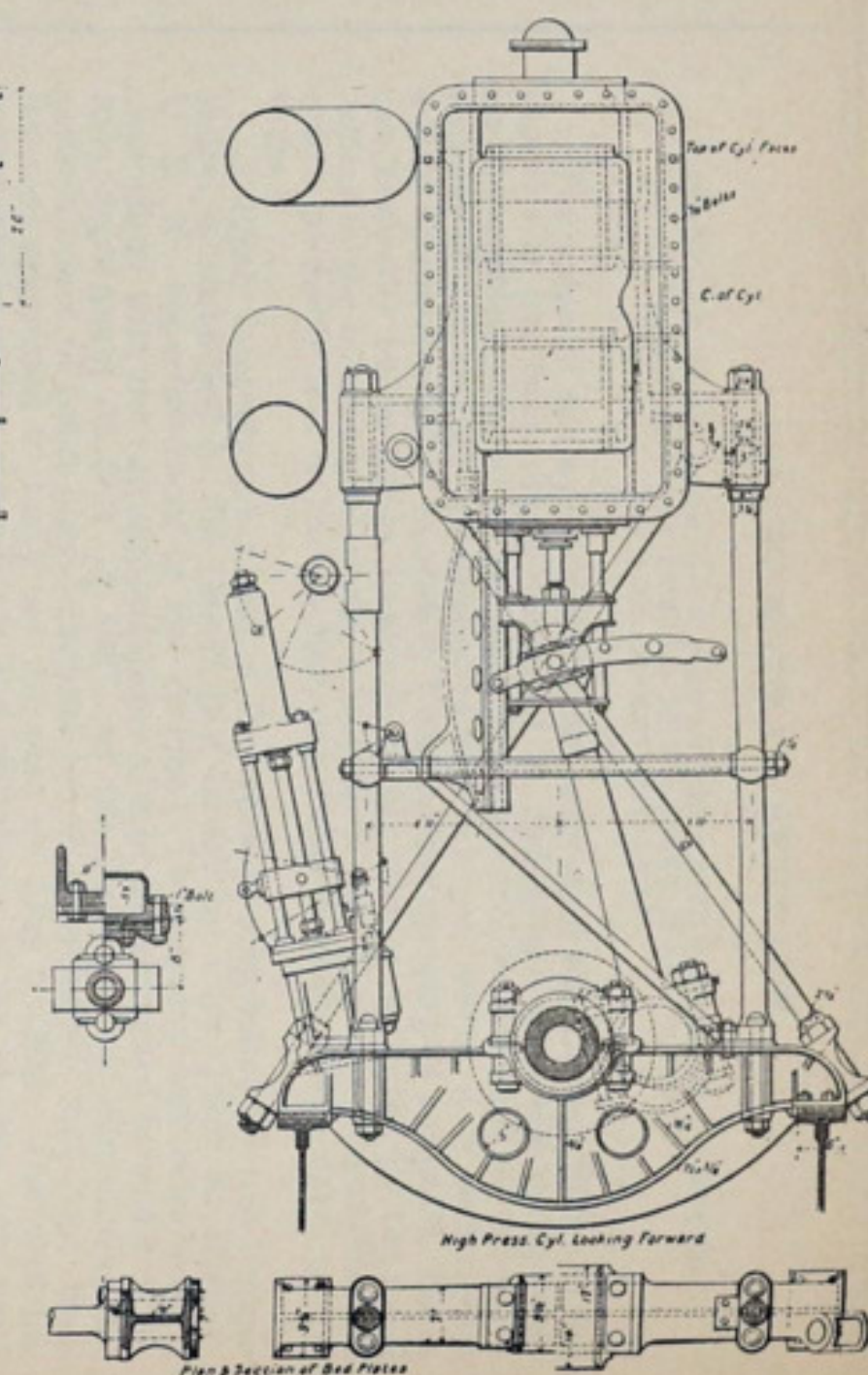
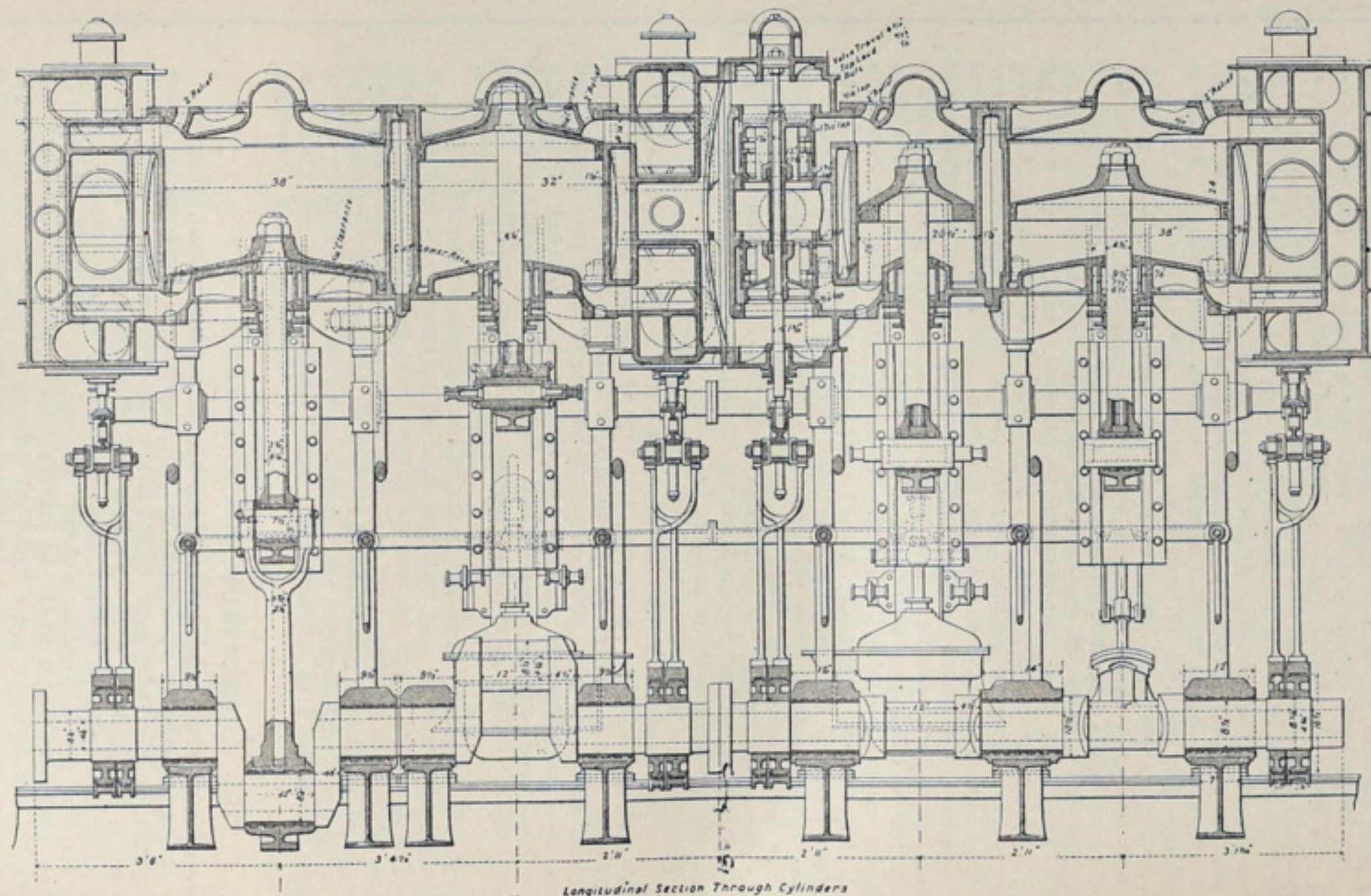
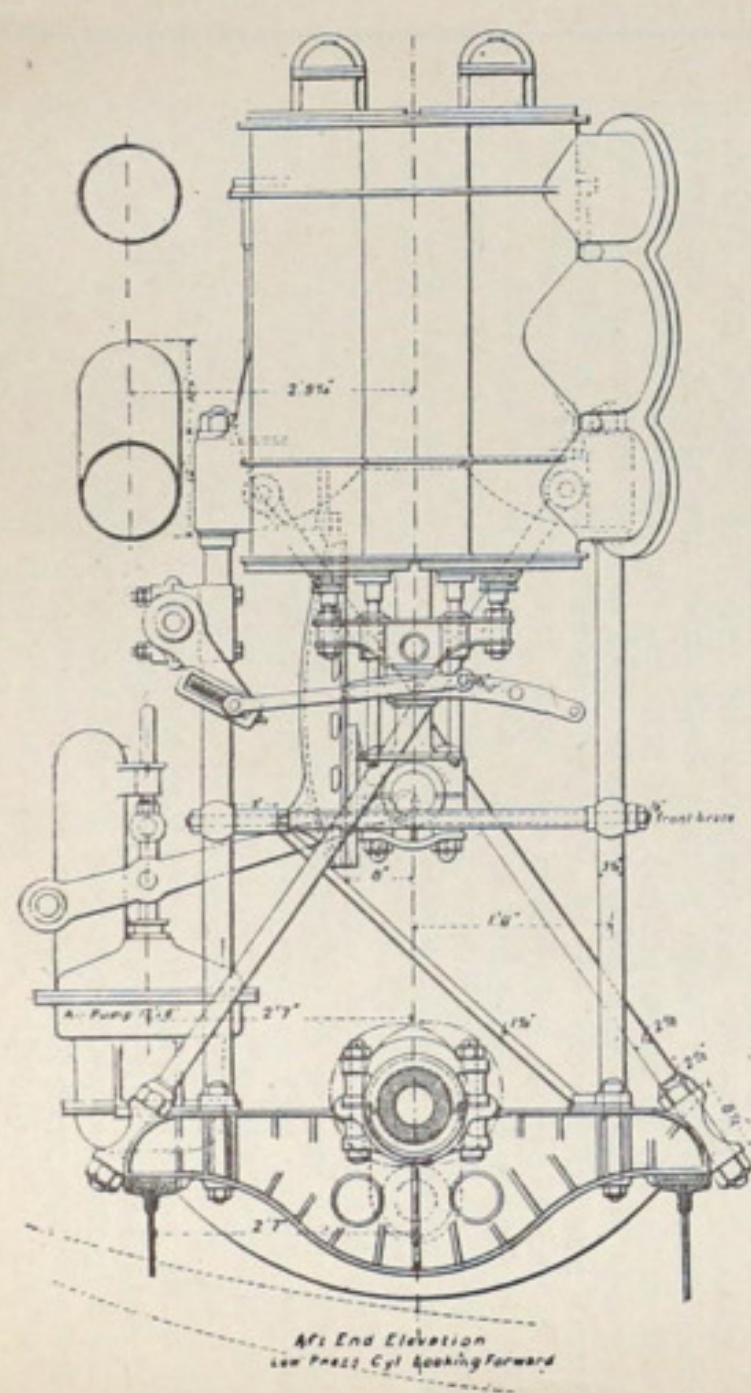
Chicago excursion via the Nickel Plate road leaves Cleveland 8:00 a. m. and 7:50 p. m., Thursday, Nov. 10; \$5.55 for round trip. Tickets good five days. 240, Nov. 10.



# NEW TORPEDO BOAT DESTROYERS FOR THE UNITED STATES NAVY.



OUTBOARD PLAN OF DESTROYER.



ENGINES FOR THE TORPEDO BOAT DESTROYERS.



## CONSTRUCTOR HICHBORN'S REPORT.

THE CHIEF OF THE BUREAU OF CONSTRUCTION AND REPAIR REVIEWS THE WORK OF THE YEAR WITH SPECIAL REFERENCE TO THE WAR OPERATIONS.

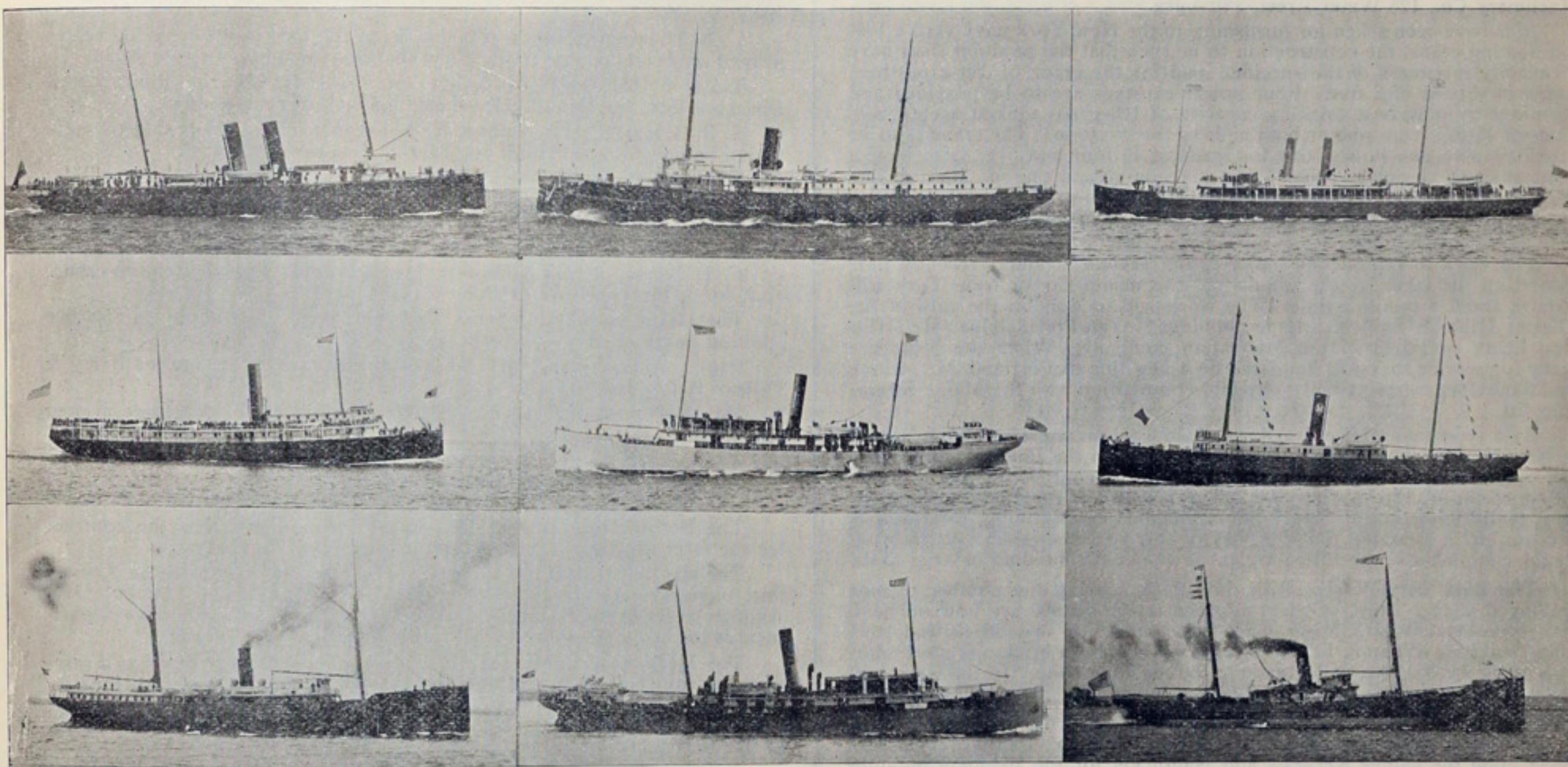
The annual report of Mr. Philip Hichborn, chief of the bureau of construction and repair, navy department, which was made public last week, is an especially valuable document by reason of the conclusions reached as a result of the chief constructor's very careful observation of the workings of the naval vessels of all classes during the war. The report is in part as follows:

"The progress made during the last year in vessels under construction for the department has been, on the whole, very satisfactory. The work upon the battleships Alabama, Illinois and Wisconsin has been held back to an appreciable degree by the impossibility of procuring armor at the time when the work had progressed to such an extent as to make it desirable to have the armor in place. The progress made in some of the torpedo vessels under construction has not fully met the requirements of the contracts, but in very many cases this work is of a character entirely new to the contractors, and the delays which have resulted are undoubtedly due to the caution naturally displayed by inexperienced builders in advancing the work. In the case of most of the vessels the delay in receiving material was presented as the reason for failure to progress properly in the work. The responsibility for such delays rests entirely with the contractors, however. The bureau has to suggest that past experiences with builders of torpedo boats would seem to indicate that it would be a wise policy, in awarding contracts, to limit builders who are

reasonable. The bureau believes, however, that events have demonstrated that the advantages gained more than compensate for the cost in money and the inconveniences resulting from the use of fire-proofed wood.

"Serious inconveniences have been experienced during the past year on account of lack of facilities for docking the battleships, and it has been necessary to resort to cleaning the bottoms of these vessels by divers—a practice very properly prohibited by the regulations except in cases of urgent military necessity, on account of the danger to which the ships so cleaned are exposed through corrosion of the under-water hull. The facilities for docking ships of smaller sizes have at times during the past year been taxed to their utmost and the need for additional facilities strongly felt. At Mare Island, the Philadelphia, upon which extensive repair work had to be done, was twice undocked before the completion of this work in order to make way for the Monterey and Monadnock, then being repaired for service at Manila. The naval constructor at Norfolk reports that the timber dock at that place has been in actual use 1,064 days, or an average of 236 days per year since January 1, 1894, and the stone dock 669 days, or an average of 145 days per year. At the time his report was made these docks were occupied by the Iris and Dolphin, respectively, while the Katahdin and Rainbow were under orders to dock. The Sterling, which had requested to be docked, had to be sent to sea without docking. The Justin, in urgent need of docking, was sent to Newport News, and the torpedo boat McKee to a private dock in the vicinity. The necessity for hastening the construction of docks appropriated for during the last session of congress is therefore strongly evident.

"The number of apprentices at the several navy yards is very small, and has been decreasing. The special character of the work at these yards makes it particularly desirable that there shall be in the force at each as



BOSTON—Yarmouth S. S. Co.  
ST. CROIX—International S. S. Co.  
INDIAN—Boston and Philadelphia.

JUNIATA—Merchants' & Miners' T. Co.  
BROOKLINE—Boston Fruit Co.  
BARNSTABLE—Boston Fruit Co.

PRINCE EDWARD—Boston and Yarmouth.  
H. M. WHITNEY—Metropolitan S. S. Co.  
ORION—Boston Towboat Co.

A GROUP OF ATLANTIC COAST STEAMERS.

entirely unfamiliar with torpedo boat or other naval work, to a single vessel, in order that they may not, on an apparent saving of a few thousand dollars, obtain their experience at an actual expense to the government in cost of superintendence, etc., and at great annoyance and serious inconvenience to it in point of time.

"Under the provisions of the last congress for 'increase of the navy,' designs have been prepared in the bureau for the construction of three seagoing coastline battleships, sixteen torpedo boat destroyers, and twelve torpedo boats, and bids for their construction invited by the department. Plans for the four harbor defense vessels of the monitor type, provided for under the same appropriation, were placed in the hands of the bidder some time since, and preliminary work upon the design of the gunboat for which appropriation was made to take the place of the United States steamship Michigan has commenced. Contracts have also been awarded for the construction of battleships, monitors, torpedo boats and destroyers. In addition to repairs and conversion at navy yards, the private ship yards have been utilized extensively for similar work under the bureau, and have rendered material assistance in expediting the preparation and maintenance of vessels for war purposes. This work has been carefully supervised by constructors in the vicinity, in addition to their regular duties.

"The naval engagements of the past few months have demonstrated so completely the necessity of avoiding the use of combustible material in the construction of vessels of war that the bureau feels that the course advocated by it to do away entirely with woodwork wherever possible and to make such woodwork as might be absolutely necessary non-inflammable has been justified by events. Some dissatisfaction has at times been manifested on account of the discomfort necessitated in the living quarters by reducing woodwork to a minimum, and the objection to the use of treated wood has been frequently strong, and at times almost un-

many men as possible of every trade, who, from their training and long service, are thoroughly familiar with this class of work. This need is more strongly felt at isolated stations and on the west coast, where the number of mechanics in the vicinity of each that are skilled in naval work is small. During the emergency work recently carried on at Mare Island navy yard it was impossible to obtain as many competent mechanics as might have been utilized to advantage. Experience shows that men who have served their apprenticeships in the large ship yards or in navy yards during the recent years make the most valuable navy yard workmen, as they are familiar with all classes of ship work under their respective trades, and their output is considerably greater than that of other mechanics, who have not had the benefit of such experience."

There is, of course, a summary of the vessels of various classes in the United States navy, together with particulars regarding the vessels added to the fleet during the war.

The Roberts Safety Water Tube Boiler Co., 39 and 41 Cortlandt street, New York, is again so crowded with work that arrangements are being made for running double turn. Among contracts completed within the year were the supplying of two boilers for the tug Dunbar, built by the Union Dry Dock Co., Buffalo, for the Maytham tug line; boiler for the dredge built for Hughes Bros. & Bangs at Buffalo; two large boilers for the centrifugal dredge of the New England Dredging Co. at Boston; three 300-horse power boilers to the Crescent Ship Yard, Elizabethport, N. J., for each of two six-screw steamers to be used on the Yukon river; two boilers for steamer Sarah A. Jenks of New York; two boilers for steam yacht Embla, and boilers for steam yacht Marietta. Responsible concerns can purchase Roberts boilers on six months' trial before paying for same. This company again paid, a few days ago, its regular annual dividend of 10 per cent.



## A COLUMN OF CONTRACTS.

MORE THAN ENOUGH NEW BUSINESS TO GO AROUND.—SHIP YARDS AND MARINE ENGINE WORKS THROUGHOUT THE COUNTRY ARE WELL SUPPLIED WITH ORDERS.

The Marietta Mfg. Co. of Marietta, O., has been awarded the contract for the engines for a new tow boat to be built at Parkersburg for L. Pope & Sons. It will be 105 feet long and 20 feet beam. The engines are to be of the lever type, with balanced valves to be operated with McCall's valve gear, dispensing with the cams. The cylinders will be 12 inches and the stroke 5 feet. The boat is to be used on the Little Kanawha and Ohio rivers. The Marietta company has also been awarded the contract for the machinery for a boat for the Vesta Coal Co. of Pittsburg. Engines of this vessel are to be of the compound tandem type, with 12-inch and 24-inch cylinders and 7-foot stroke. There will be three 38-inch two-flue boilers 28 feet long. This boat will be used for towing on the Monongahela river.

Bidders for machinery to be furnished to the Norfolk navy yard include the following: Bement, Miles & Co., Philadelphia; Niles Tool Works Co., Hamilton, O.; Cumberland, Dugan & Co., 3 South Charles street, Baltimore; F. H. Lovell & Co., 118 John street, New York; Manhattan Supply Co., 160 Duane street, New York; Harry S. Manning, 111 Liberty street, New York; Israel H. Johnson, Jr., & Co., 1422 Callowhill street, Philadelphia; The Ansonia Brass & Copper Co., 19 Cliff street, New York; George L. Neville, Portsmouth, Va.; Fitchburg Machine Works, Fitchburg, Mass.; Merchant & Co., 517 Arch street, Philadelphia; New Jersey Foundry and Machine Co., 26 Cortlandt street, New York; U. Baird Machinery Co., 123 Water street, Pittsburg.

Bids have been asked for furnishing to the New York navy yard a 100-ton floating crane, the construction to be such that the pontoon shall have a capacity in excess of the specified load for the crane of 300 gross tons and a freeboard of 2 feet. Four power capstans are to be provided and the crane must have a working capacity of 100 gross tons at a clear distance of 45 feet from one or both ends of the pontoon. The crane is to be provided with two hoists; one for loads of 40 tons and over is to have a vertical speed of not less than 7 feet per minute and one for loads of less than 40 tons is to have a maximum vertical speed of not less than 25 feet per minute. The maximum horizontal travel of all hoists is to be not less than 100 feet per minute.

The work of remodeling and refitting several steamers recently purchased on the lakes by the Manhattan Steamship Co. of New York will require about a month's time. The work will be done at the yard of the Charles Hillman Ship & Engine Building Co. at Philadelphia, Mr. Hillman being president of the Manhattan company. When the boats are ready for service they will be placed on a new line to Portland, Me., where the Manhattan company will come into competition with the Maine Steamship Co.

By a recent transfer of holdings of stock Manning, Maxwell & Moore of New York relinquish the controlling interest in the Pond Machine Tool Co. of Plainfield, N. J., and in turn acquire control of the Putnam Machine Co. of Fitchburg, Mass. The product of the Pond works constituted the only line of large tools handled by Manning, Maxwell & Moore, but it is stated that the loss of this representation will be offset by the equipment of the Putnam plant to enable the building of large tools.

The Bath Iron Works, Bath, Me., is increasing the number of men employed almost daily. Orders aggregating \$2,640,000 are now on hand and improvements are being made constantly. A new brick and steel office building will soon be under way, as will also a brick and steel addition of 100 by 300 feet, to be made to the machine shop. In the latter will be 50 feet of crane space, which will be occupied by a 20-ton electric crane, with a hoist of 35 feet, and a 5-ton electric crane, with a hoist of 25 feet.

The Merchants' and Miners' Transportation Co., Baltimore, has decided upon the names Kershaw and Nantucket for the steamers building for them by the Harlan & Hollingsworth Co. of Wilmington, Del., and which were described and illustrated in the Review some weeks ago. The contracts for these vessels were not signed until within the present year, and one will be ready for delivery on April 1, and the other on May 1 of next year, in accordance with contract.

The bureau of supplies and accounts, navy department, has issued a call for bids to be opened Nov. 29, for delivering condenser tubes at the Mare Island navy yard. The specifications provide for 10,000 seamless drawn Muntz metal condenser tubes, 5/8-inch outside diameter, No. 18 B. W. G., compounded of new materials, 60 per cent. of pure copper and 40 per cent. of pure zinc.

Enoch Moore & Sons, Wilmington, Del., finished on Monday of this week a tank barge for the Standard Oil Co., 125 feet in length, 30 feet beam and 10 feet deep. The barge contains three compartments with a capacity of 75,000 gallons, and besides this she will carry about the same amount in small packages. The total capacity is 600 tons.

The Burlee ship yard at Port Richmond, Staten Island, has a contract for two tugs for the Dalzell Towing Co. of New York. One, to be known as the Fred B. Dalzell, will be 110 feet in length and will be used for seagoing service, whereas the other, the Edward T. Dalzell, will be 90 feet in length and used for harbor service only.

Bids submitted for a traveling crane for the Norfolk navy yard were as follows: Morgan Engineering Co., Alliance, O., \$14,952; William Sellers & Co., 1600 Hamilton street, Philadelphia, \$11,980; Henry S. Manning, 111 Liberty street, New York, \$14,221; Wellman-Beaver Engineering Co., Cleveland, O., \$19,760.

Chas. Reeder & Sons, Baltimore, Md., have secured a contract from the Queen Anne Railroad Co. of Baltimore, for a \$100,000 steamer. The boat will be 200 feet long, 50 feet beam and 5 feet draught (a side wheeler), and is expected to accommodate 1,200 passengers and attain a speed of 18 knots per hour.

The Gas Engine & Power Co., and Chas. L. Seabury & Co., Morris Heights, N. Y., have the contract to build a steam launch, naphtha launch,

two life boats, a gig and a dingey for the steam yacht Josephine, building by the Neafe & Levy Co., Philadelphia.

The New Haven Steamboat Co. will build another fine steamer, plans for which are being prepared by A. Cary Smith, naval architect. Mr. Smith designed the Richard Peck and City of Lowell, and he says that the new vessel will be superior to both in size as well as speed.

The Fore River Engine Co., Weymouth, Mass., and George Lawley & Son Corporation of South Boston, who have secured contracts for torpedo boat destroyers, will, in the near future, place orders for considerable new machinery.

At a meeting of the Portland Dry Dock Co. (Portland, Me.) directors were elected for the ensuing year as follows: Jacob S. Winslow, John Marshall Brown, Phillip Greely Brown, Ardon W. Coombs, and E. S. E. McClellan.

Bement, Miles & Co., Philadelphia, are rushed with orders and are now employing regularly over 875 men. Among the orders recently booked is one for two large gun lathes from Vickers, Son & Maxim, England.

James M. Bayles & Sons, Port Jefferson, Long Island, N. Y., are negotiating with a New York yachtsman for the construction of a 115-foot wooden steam yacht to be built during the winter.

W. J. Wood, naval architect of Chicago, has prepared plans and specifications for a steam yacht, which will be built at Brooklyn, N. Y., this season, for William Gillette, the dramatist.

The Bethlehem Iron Co. has received the order for the forgings for the engines of the new battleship Maine which the Cramps are building. The forgings will weigh over 300 tons.

Bids have been asked for dredging a portion of the Erie basin at Buffalo; George W. Aldridge superintendent of public works, Albany, N. Y.

C. B. Harrington, Bath, Me., writes to the Review to deny the report printed in several papers to the effect that he is building a steam yacht.

James C. Mitchell, boat builder of Lewiston, Me., has built a new wharf and boat house and will enlarge his facilities materially.

S. B. Greacen, Perth Amboy, N. J., is constructing a fore-and-aft compound engine for the rebuilt tug Henry A. Crawford.

The tugboat Peacock was launched at the Brooklyn navy yard last week. She is built of steel and is 75 feet in length.

George E. Whitney of East Boston, Mass., is building a quadruple expansion engine for a new 80-foot steam yacht.

C. F. Brown of Pulpit Harbor, Me., will build a small steam pleasure craft for J. Murry Howe of Boston.

The Deane Steam Pump Co., Holyoke, Mass., is building a \$500,000 addition to its plant.

Paul Leroux, Albany, N. Y., has begun work on a dredge for Berry & Falls of Bath, Me.

Hay & Wright of Oakland, Cal., have begun work on a three-masted schooner.

## TRADE NOTES.

The Berlin Iron Bridge Co., East Berlin, Conn., has the contract for the steel work for a bridge for the Utica Belt Line Ry.

The war department has ordered the installation of sixty-three Kenney flushometers in the transport Mohawk, now being overhauled at Bath, Me. Another order to the Kenney company (New York) from the navy department is for flushometers to be used in buildings at Washington.

The Mechanical Fabric Co., Providence, R. I., is very busy with government contracts. During the past year this company has furnished its "Perfection" inflated mattresses for the hospital ship Solace (complete); also for officers' quarters on nearly all the naval vessels and for several of the marine hospitals.

A pencil seems a rather insignificant thing, but that taken in quantity they resolve themselves into something quite important, is evidenced by the fact that the Joseph Dixon Crucible Co. of Jersey City, N. J., has just added to their pencil factory an extension of 40 by 90 feet, and three stories in height. The Dixon company was established in 1827, but in all the three score years of its history none has approached the amount of business already handled in 1898, and it is now certain that further additions to the great plant must be made next year. Pencils are, of course, only a part of the business of this concern, which is known in all parts of the world on account of the variety and great extent of its product in lubricating lines.

The Boston & Lockport Block Co. has recently been made the recipient of some very flattering compliments as the result of its highly interesting exhibit at the twentieth triennial exhibition of the Massachusetts Charitable Mechanic Association. The display is intended principally to demonstrate the quality of yacht blocks manufactured by the company, but there is shown also the company's diaphragm pump for contractors and sewerage work, and a sample of 24-inch double extra heavy purchase block with bail, metaline self-lubricating bushed, which has a capacity of not less than 75 tons, and is intended for railroad and extra heavy work. This block was part of the Boston company's exhibit at the Chicago exposition and received an award there.

For a comfortable trip to New York take Pennsylvania No. 6, which leaves Union station daily at 1:40 p. m., and from Euclid avenue 1:50 p. m., arriving New York 7:43 next morning. Pullman's very best sleepers run through on this train without change. Supper is served in dining car. Note that the train stops at Euclid avenue station, saving the tedious ride down town to those living in the eastern part of the city. Phone main 1263 or east 513 for space and full information.

Excursion to Chicago, leaving Cleveland 8:00 a. m. and 7:50 p. m. Thursday, Nov. 10, via the Nickel Plate road; \$5.55 for round trip. Five-day limit.

239, Nov. 10.

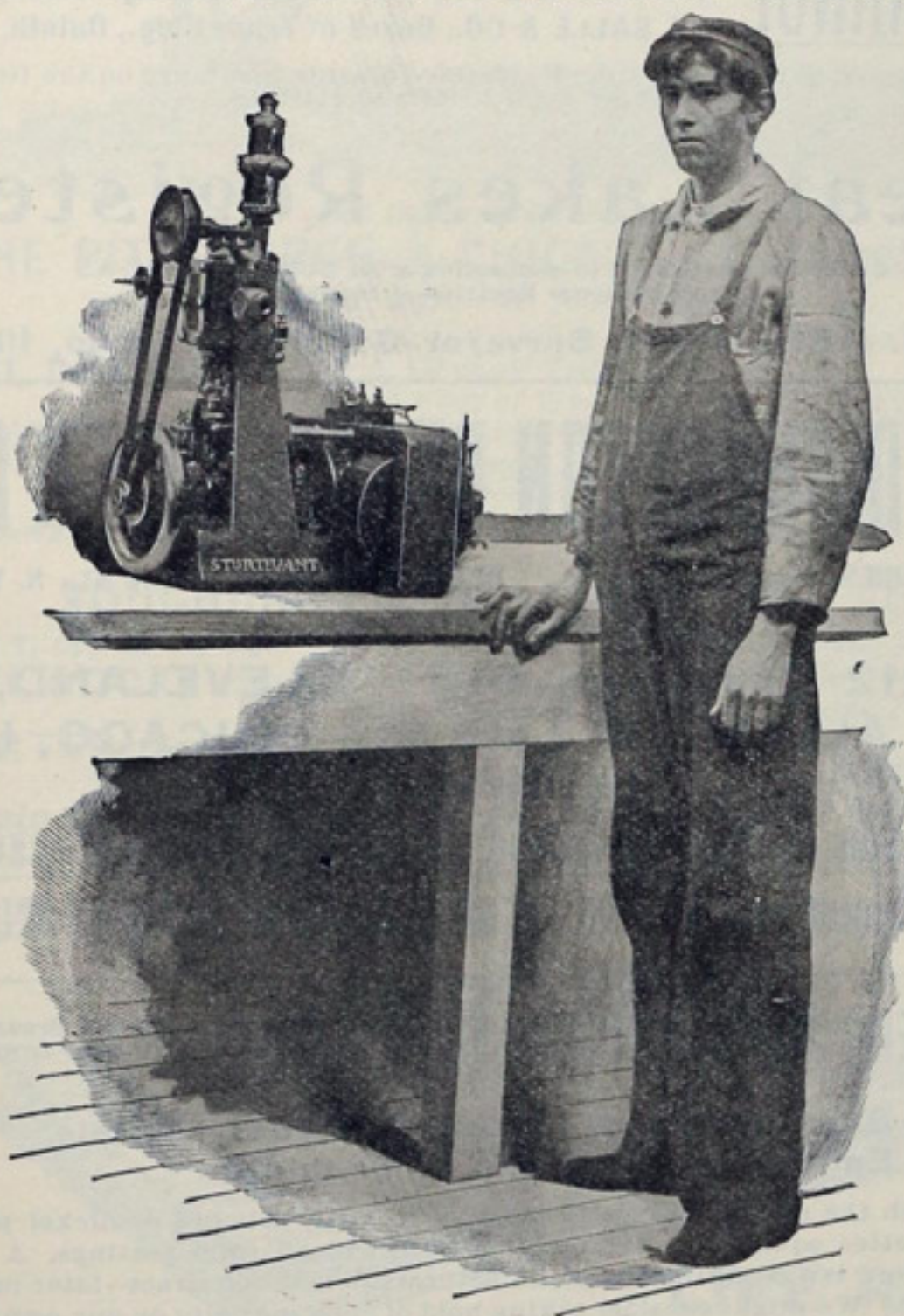


## A VERY SMALL GENERATING SET.

The "Midget" generating set, illustrated herewith, is probably one of the smallest and most perfectly designed direct-connected machines ever constructed. The photograph is from one of a number recently built by the B. F. Sturtevant Co., Boston, Mass., for the United States navy, to be used in torpedo boat service. The salient features of the design are reliability, low temperature, good regulation, ability to stand continuous overloads, a minimum of attendance, high weight efficiency and compactness. This generating set was designed to be able to develop its rated output continuously with absolutely no sparking at the brushes and with a temperature rise not to exceed 60° Fahr., while the total weight of the engine and dynamo complete ready for steam pipe was limited to 500 pounds for a rated capacity of 1.5 K. W. The speed adopted was 1,000 revolutions per minute, and as the engine weighed 150 pounds complete, the weight of the dynamo could not exceed 350 pounds. In the finished design of the generator this weight was reduced to 250 pounds, of which 75 pounds was the weight of the armature complete, making the entire weight of the set only 400 pounds; that is, 100 pounds inside the limit. The diminutive size of the set is emphasized by comparison with its companion figure, the machinist. The weight efficiency of the outfit complete is 0.266 pounds per watt output at rated capacity.

In order to insure steadiness in running, as well as to economize in head room, the center of gravity was kept as low as possible by the adoption of the consequent-pole type of magnetic circuit, giving a four-pole field with only two field coils, which coils being placed on the horizontal pole-pieces, reduce the height of the frame and consequent height of the shaft center to a minimum, and at the same time render a sub-base unnecessary.

The field magnet consists of a wrought iron forging, to which are bolted the horizontal pole-pieces. The armature is of exceptionally large



diameter, in order to facilitate ventilation and present as great a radiating surface as possible. Core discs are mounted on a brass spider, having a flange support for the armature coils on the back end and an extended sleeve for support of commutator on the front. Ventilation of the core is facilitated by means of air-ducts placed in the center and at each of its ends, which air-ducts consist of a series of radial vanes, which, when rotated, act as a centrifugal blower. As the back end of the spider is completely closed and oil proof, all the air is drawn through the commutator, which is of skeleton construction and also of very large diameter.

Brush holders are of the reaction type, two only being used, as the armature is of the two-circuit, four-pole, barrel-wound type without cross connections. The brush yoke is supported by a projection from the out-board bearing. The generator is compound-wound for a constant E. M. F. (at constant speed) at all changes of load from no load to 50 per cent overload, and can stand this variation without sparking at commutators or any movement of brushes. A continuous overload of 25 per cent can be carried with safety. The weight efficiency at the rated output is remarkable, considering the amount of overload that can be carried and the low temperature rise.

The engine, upon which the effectiveness of the combination depends, is of special construction designed to form a symmetrical part of the whole machine. Its single cylinder is 2 inches diameter by 2 inches stroke. All parts are provided with continuous oiling devices. Bearing surfaces are large and carefully finished, and every feature essential to sustained operation at 1,000 revolutions per minute has been introduced.

Round trip Chicago \$5.55 via the Nickel Plate road, leaving Cleveland 8:30 a. m. and 7:50 p. m., Thursday, Nov. 10. Good five days returning. 241, Nov. 10.

## CHAINS AND CABLES ON SHIPS.

Few persons identified with shipping interests, save possibly the ship builders or vessel owners who pay the bills, ever stop to consider the extent to which chains and cables are used on board ship. Conclusions of this kind are forced by the proportions to which the business of leading chain works has increased of late. Officials of the Lebanon Chain Works inform the Review that notwithstanding numerous improvements at their plant at Lebanon, Pa., they are still crowded to fullest capacity. This concern, which is one of the oldest of its kind in the country, is now supplying ship builders from Bath, Me., to San Francisco, and is also well known to officials of different departments of the government, having been successful bidders every year, for some time past, for light vessel and buoy chains, for anchor cables, etc.

## TESTS OF STEEL RIVETS.

"Tests of Steel Rivets" is a subject of interest to ship owners and ship builders. Mr. Oscar Textor presented a paper on this subject at a recent meeting of the Engineers' Club of Cleveland. The paper was illustrated by lantern views and a variety of specimen rivets, which had been subjected to severe tests. The material experimented upon was Basic open hearth steel, the average chemical analysis of which, stated in percentage, is as follows: Phosphorus, .015; manganese, .46; sulphur, .033; silicon, .005; carbon, .11. The rivets were tested for tensile and shearing strength, also by nicking and bending cold, and for their behavior under the hammer, both hot and cold. Tests were also made to discover crystallization under the rivet head, if any. The results were described as being very satisfactory, and the conclusion was reached that with proper manipulation and attention to temperature, such steel rivets are fully equal to the best wrought iron rivets and possess a superior tensile strength.

Low rate to Chicago and back via the Nickel Plate road, Nov. 10. Special train leaves Cleveland 8:00 a. m. and tickets will also be available on train No. 1 of same day, due to leave Cleveland 7:50 p. m. Round trip \$5.55. 242, Nov. 10.

**NOTICE.**—The steam pile driver "FISHING QUEEN", owned by John W. Averill, Jr., burden about 7.91 tons, together with boilers, machinery, anchors, cables, furniture, tackle, and all appurtenances, will be sold from the west steps of the Post Office Building, Cleveland, Ohio, on Tuesday, November 29, 1898, at 10 o'clock, A. M., to satisfy an indebtedness of \$7,700.00 of the National Bank of Commerce of Cleveland, Ohio, against said John W. Averill, Jr., under a certain mortgage, recorded Book 71, page 72, Office of Collector, Cleveland, Ohio. SQUIRE, SANDERS & DEMPSEY, Attorneys for National Bank of Commerce of Cleveland, Ohio. Nov. 24.

## FOR SALE—STEAM BARGE and CONSORT.

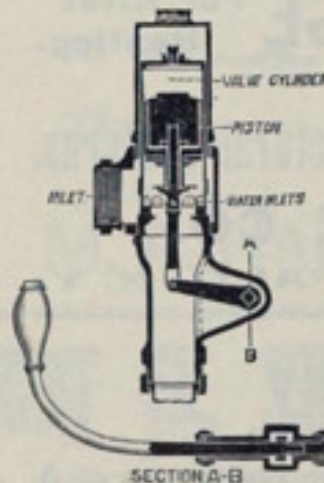
STEAM BARGE classes A 1\*; capacity, 600M feet of lumber, 33,000 bushels of Wheat or Corn, 900 tons of ore; light draft; in good condition.

CONSORT classes A 2; capacity on 12 feet of water, 850 tons of ore, 32,000 bushels of Grain, 700M feet of dry lumber. Good trade will be offered. Address

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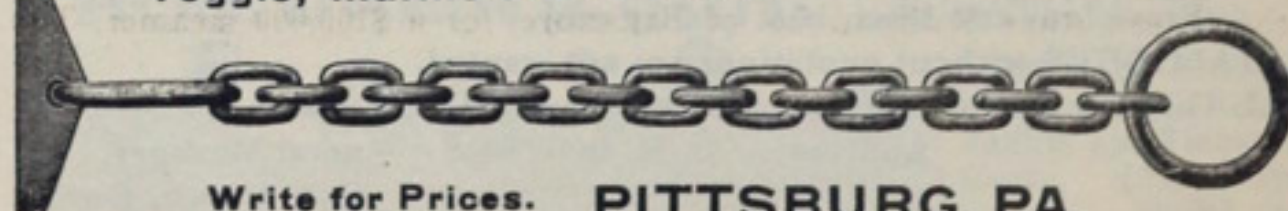
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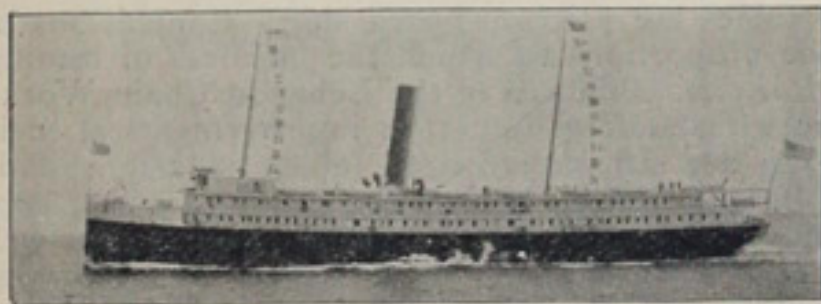
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Can furnish the rough castings or completed parts, polished or nickel plated. No one better equipped. Skilled workmen. Clean solid castings, A No. 1 quality. Now is a good time for manufacturers to make contract—later on may be too late. We might consider taking hold of good specialty on our own hook Write

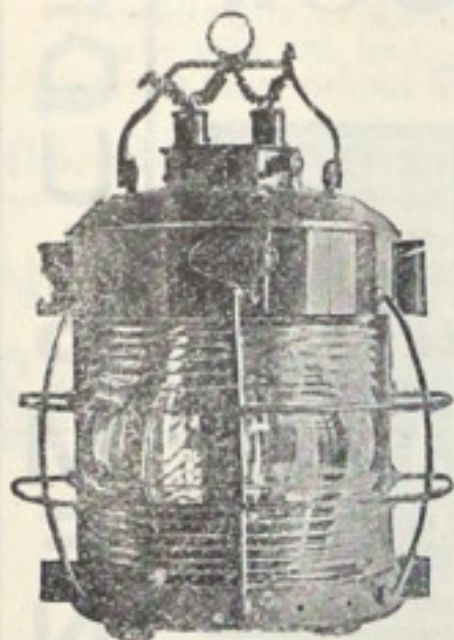
**STANDARD BRASS WORKS, Kalamazoo, Mich.**

**NOTICE.**—The Pro. Tug HELENE, owned by John W. Averill, Jr., burden about 12.50 tons, together with boilers, machinery, anchors, cables, furniture, tackle, and all appurtenances, will be sold from the west steps of the Post Office Building, Cleveland, Ohio, on Tuesday, November 29, 1898, at 10 o'clock, A. M. to satisfy an indebtedness of \$7,700.00 of the National Bank of Commerce of Cleveland, Ohio, against said John W. Averill, Jr., under a certain mortgage, recorded Vol. 17, page 71, Office of Collector, Cleveland, Ohio. **SQUIRE, SANDERS & DEMPSEY, Attorneys for National Bank of Commerce of Cleveland, Ohio.** Nov. 24.

**NOTICE.**—The steel steam fish pile driver "IDEAL", owned by John W. Averill, Jr., burden about 13.18 tons, together with boilers, machinery, anchors, cables, furniture, tackle, and all appurtenances, will be sold from the west steps of the Post Office Building, Cleveland, Ohio, on Tuesday, November 29, 1898, at 10 o'clock, A. M., to satisfy an indebtedness of \$7,700.00 of the National Bank of Commerce of Cleveland, Ohio, against said John W. Averill, Jr., under a certain mortgage, recorded Vol. 17, page 71, Office of Collector, Cleveland, Ohio. **SQUIRE, SANDERS & DEMPSEY, Attorneys for National Bank of Commerce of Cleveland, Ohio.** Nov. 24.

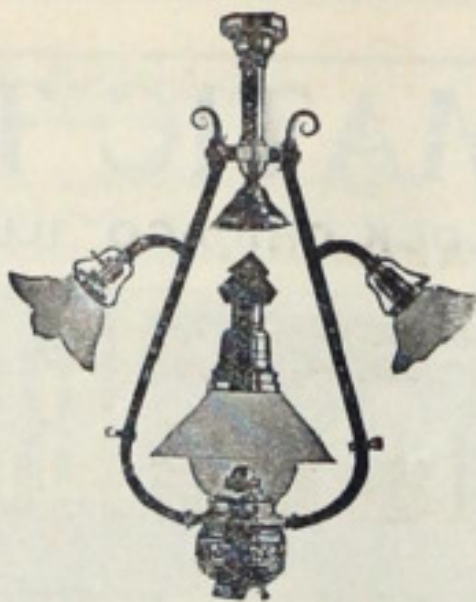


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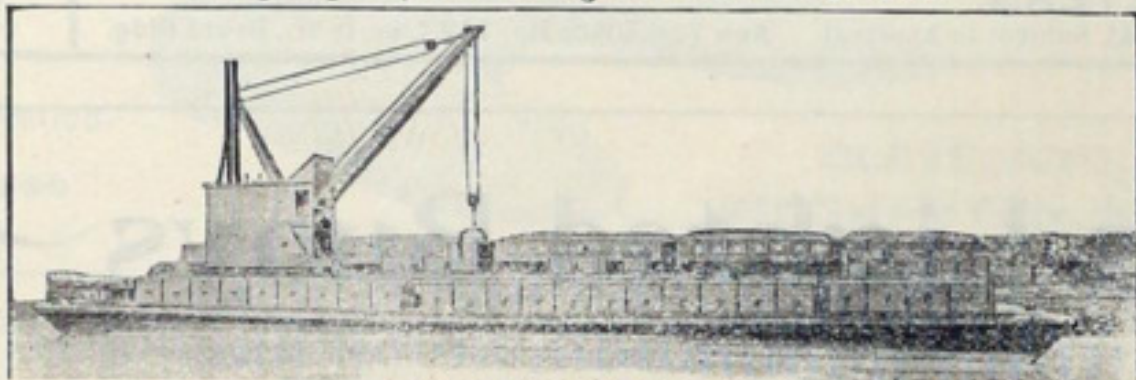
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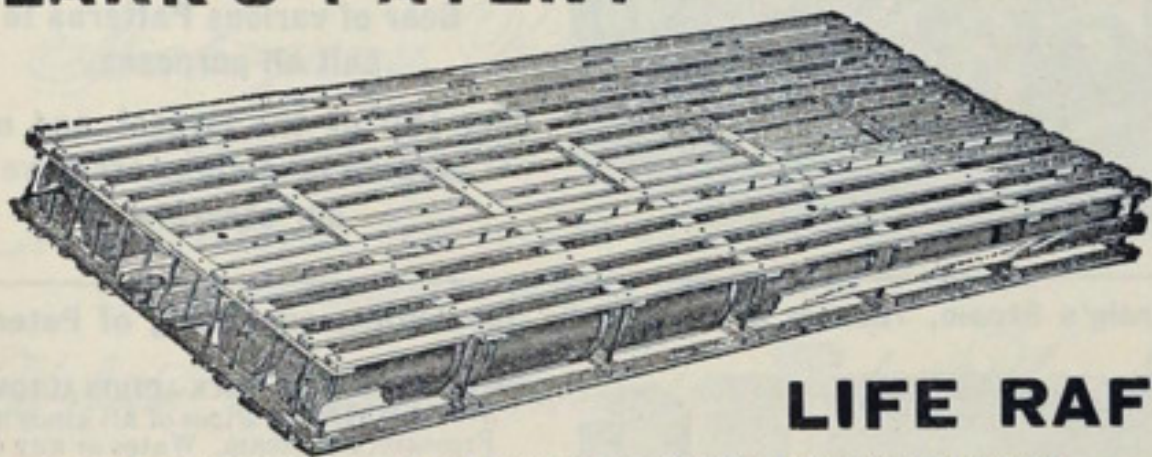
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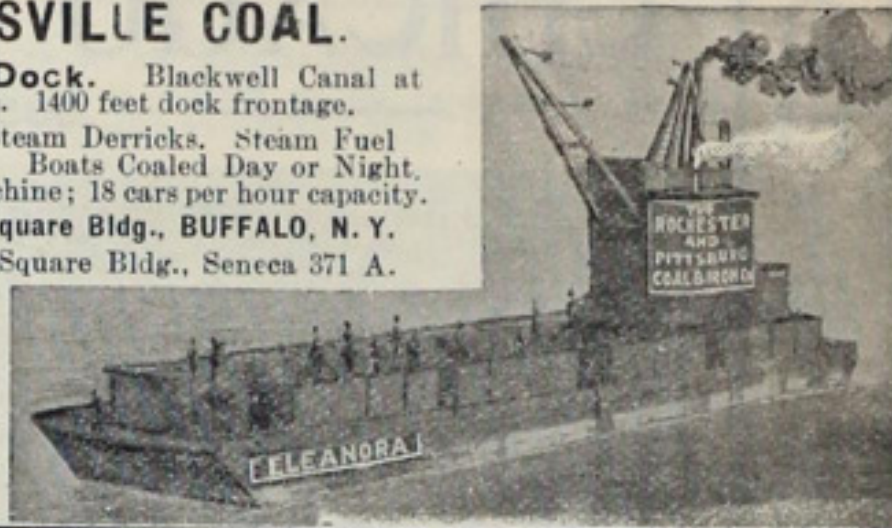
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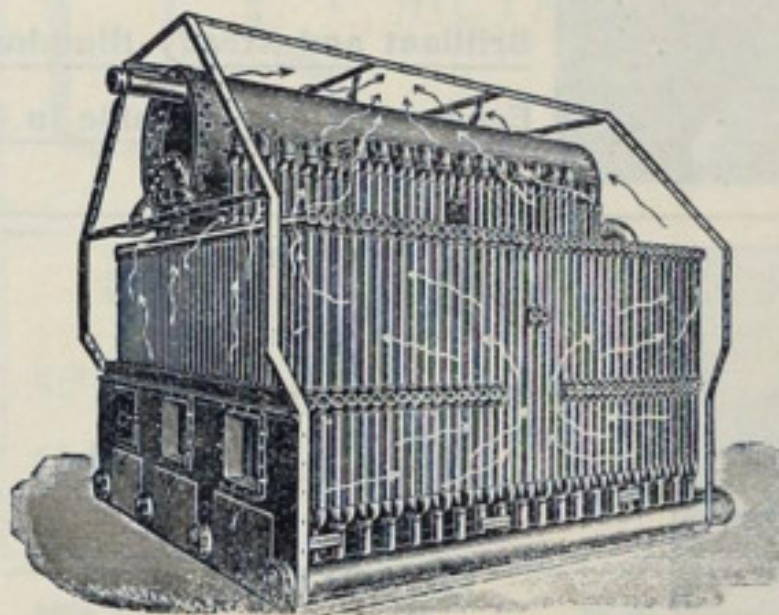
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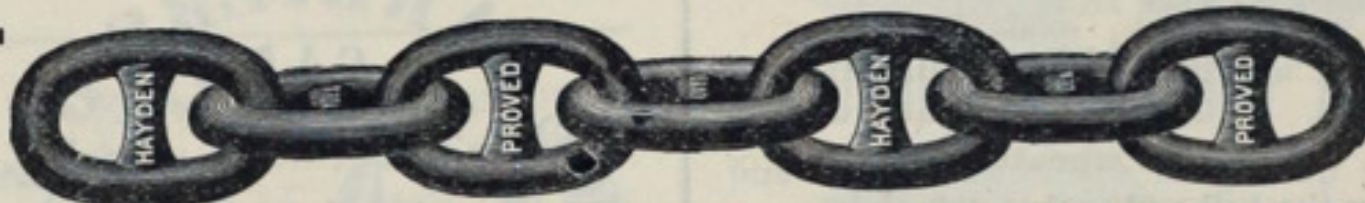
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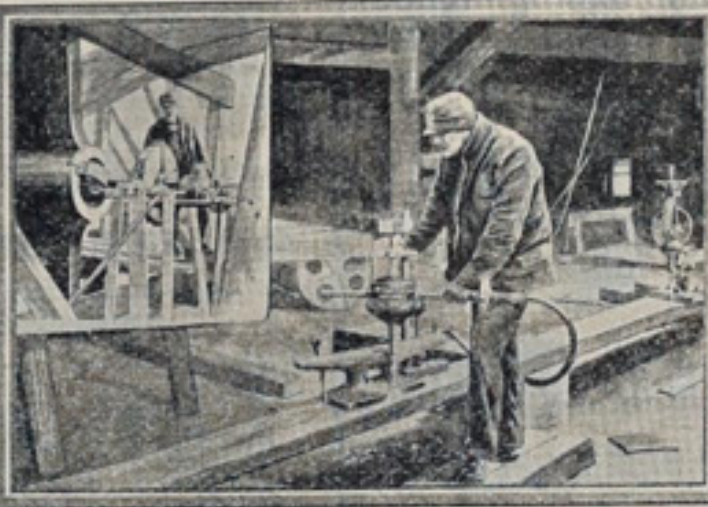
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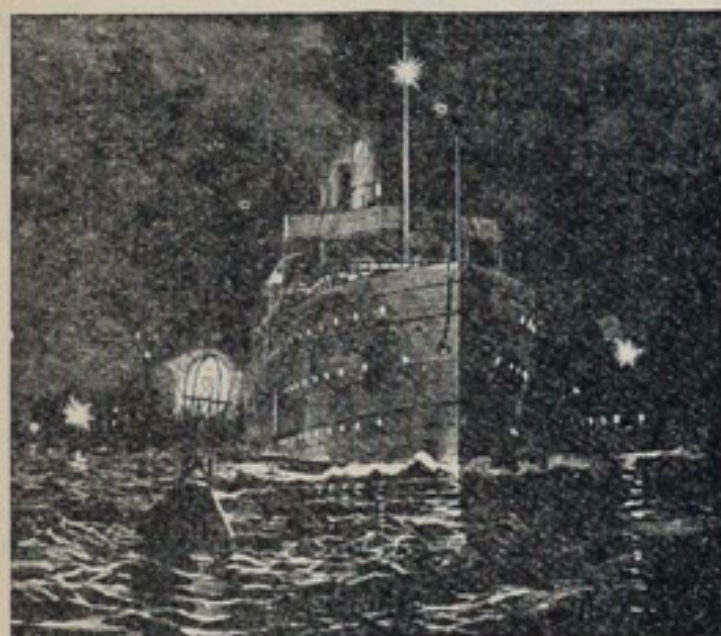
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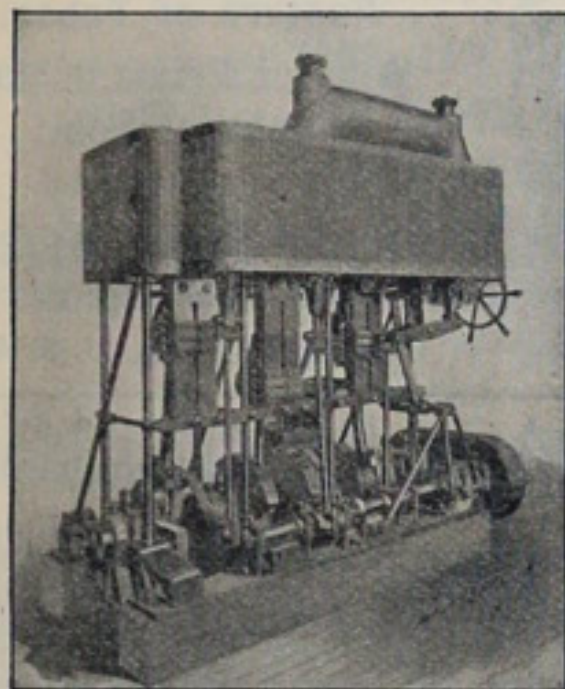
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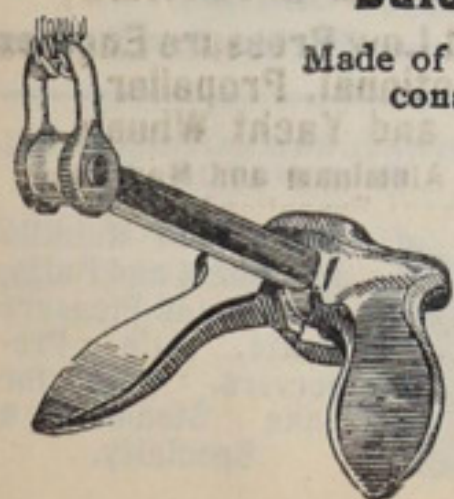
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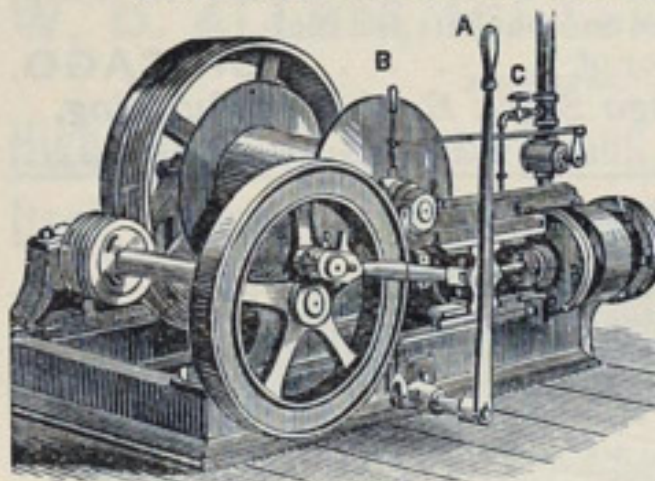
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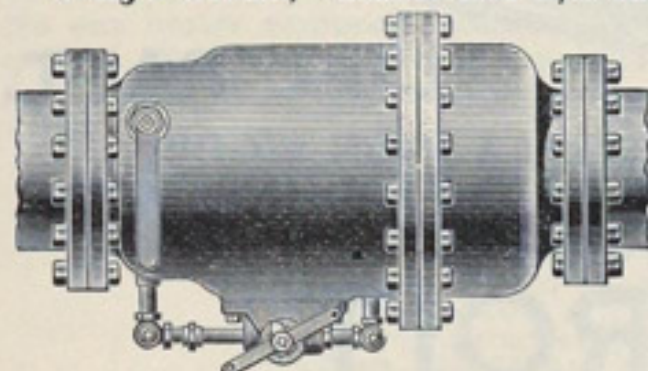


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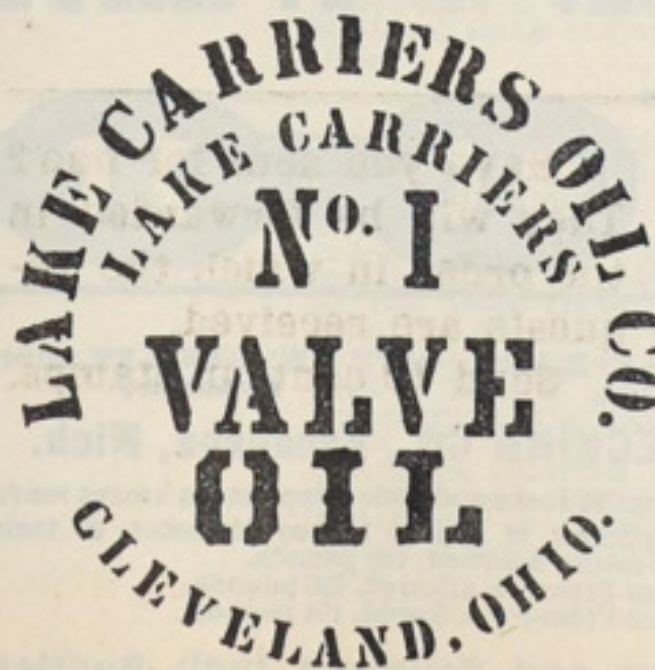
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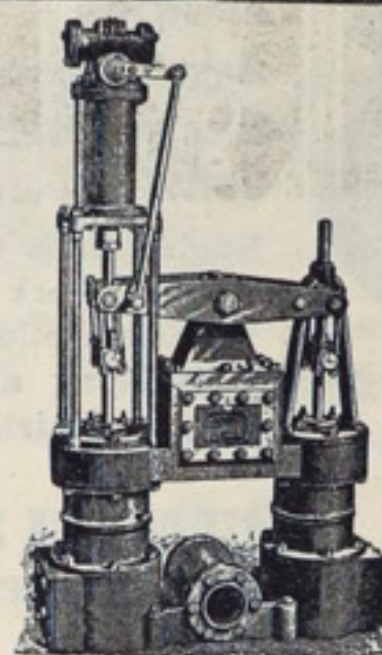
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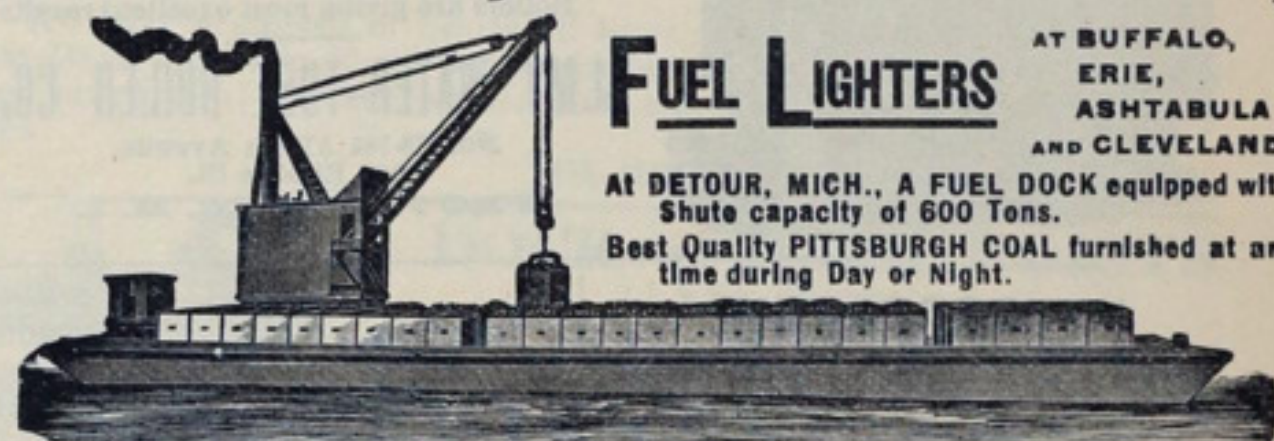
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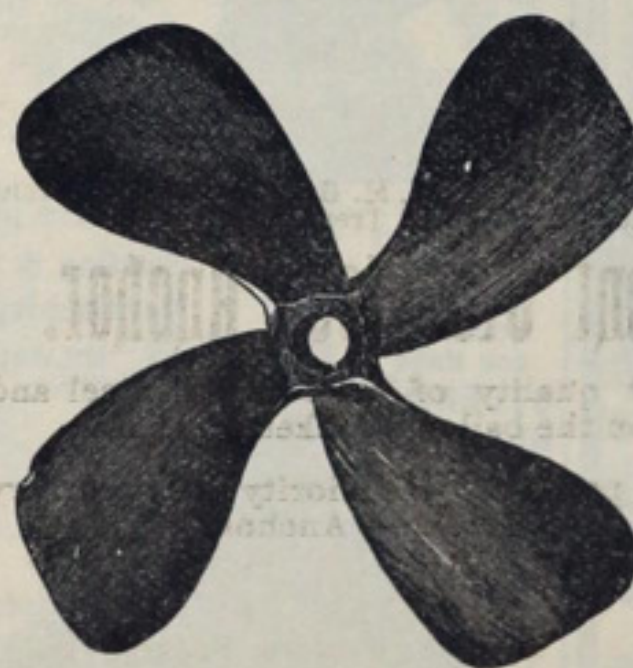
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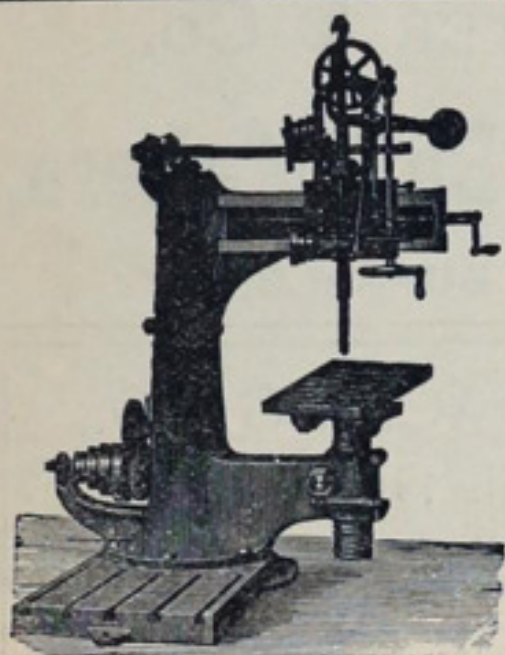
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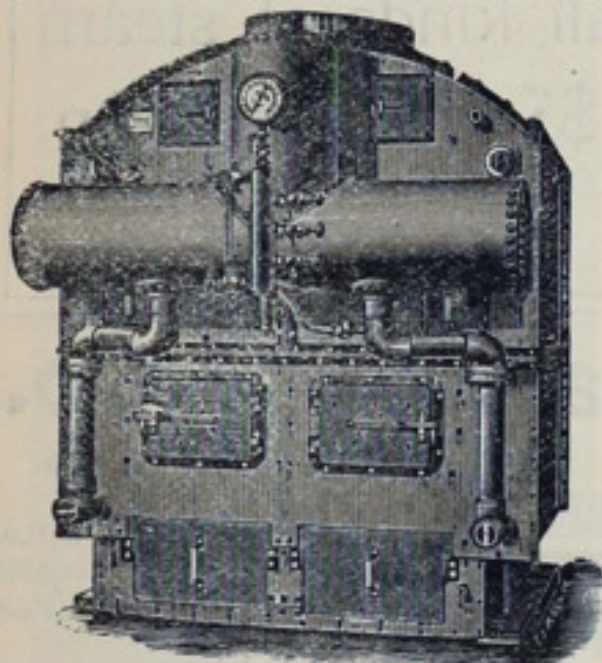
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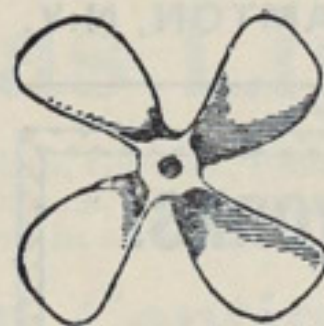


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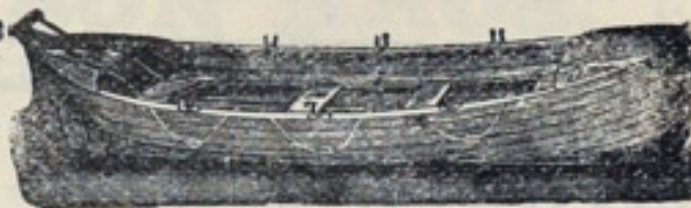
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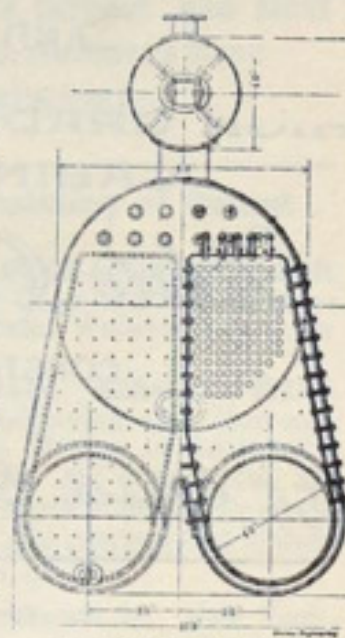
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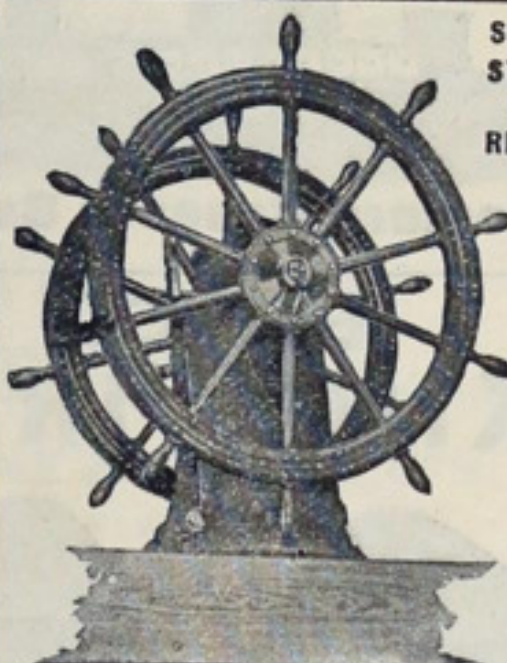
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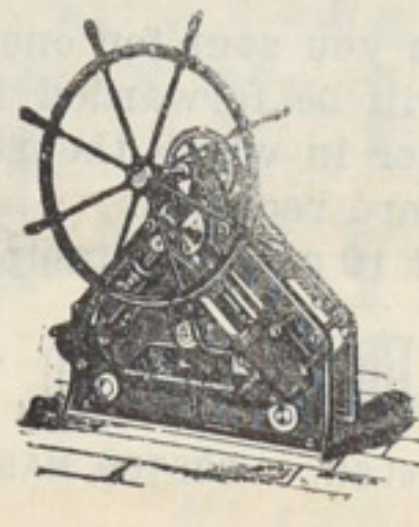
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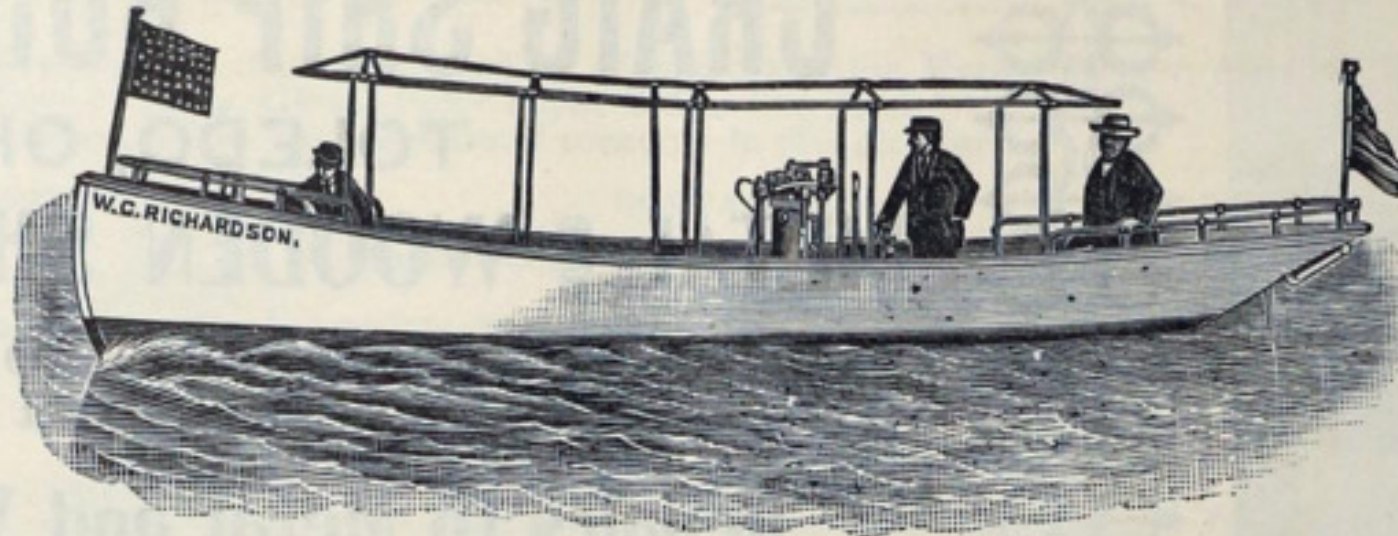


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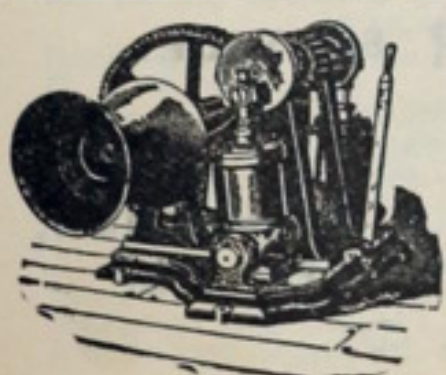
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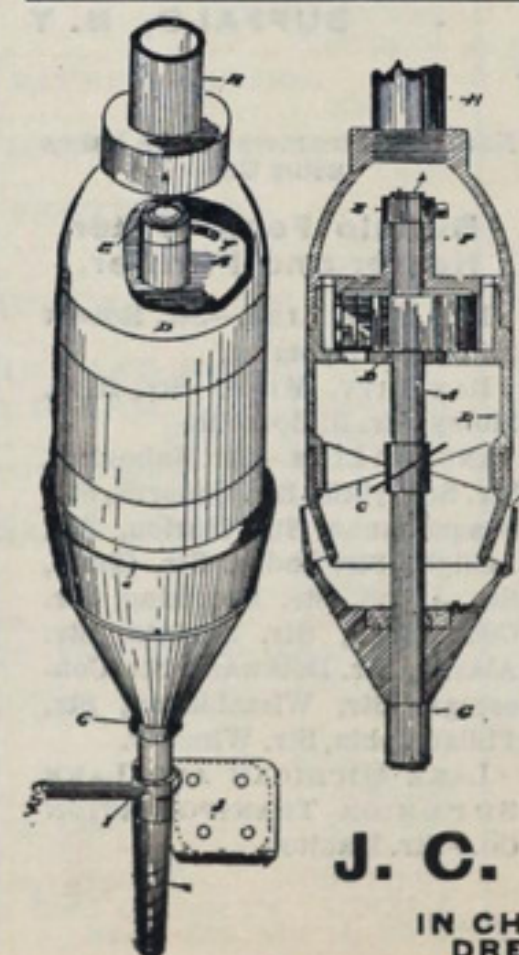
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Milwaukee, Wis., Broadway & Mason.  
Sheboygan, Wis.  
Manitowoc, Wis.  
Green Bay, Wis.

Marquette, Wis.  
Oshkosh, Wis.  
Duluth, Minn.  
West Superior, Wis.  
Hancock, Mich.  
Marquette, Mich.

Buffalo, N. Y.  
Sault Ste. Marie, Mich.  
West Bay City, Mich., M.C. Ry. & 10th St.  
Saginaw, Mich., Eighth & Sears Sts.  
Detroit, Mich., 46 Jefferson.  
Toledo, O., Summit & Monroe Sts.



ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.  
D. ROBESON, Port Huron, Mich.  
W. B. MCKINNON, Ashtabula Harbor, O.  
GULL & RAND, Huron, O.

EDWARD BRAMMALL, Benton Harbor, Mich.  
BABY & DALE, St. Clair, Mich.  
N. C. ALTEN, Lorain, O.  
A. F. HARRINGTON, Conneaut Harbor, O.

MARINE SUPPLY Co., Fairport, O.  
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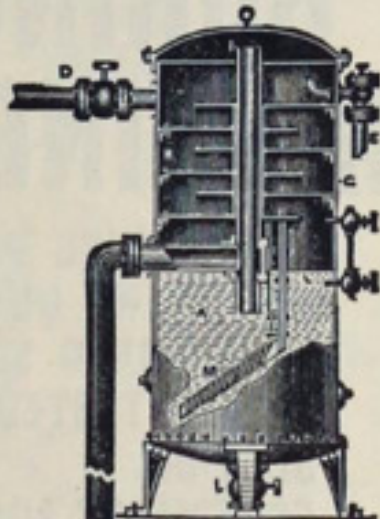
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# BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, published by the Marine Review, 418-419 Perry-Payne Bldg., Cleveland.  
See accompanying index of advertisers for full addresses of concerns in this directory.

## ARTIFICIAL DRAFT FOR BOILERS.

Detroit Dry Dock Co. .... Detroit.  
B. F. Sturtevant Co. .... Boston.  
Globe Iron Works Co. .... Cleveland.  
H. Bloomsburg & Co. .... Newport News, Va.

## ADJUSTERS.

Johnson & Higgins. .... Buffalo.  
Chas. E. & W. F. Peck. .... Chicago.

## ANCHORS.

Baldt Anchor Co. .... Chester, Pa.  
International Anchor Co. .... Cleveland.

## ANTI-FRICTION METALS.

Magnolia Metal Co. .... New York.  
Phosphor Bronze Smelting Co., Ltd. .... Philadelphia.  
Wm. Cramp & Sons. .... Philadelphia.

## ASBESTOS.

H. W. Johns Mfg. Co. .... New York.

## ATTORNEYS AND PROCTORS IN ADMIRALTY.

Harvey L. Brown. .... Buffalo.  
Harvey D. Goulder. .... Cleveland.  
Albert J. Gilchrist. .... Cleveland.  
Orestes C. Pinney. .... Cleveland.  
Hoyt, Dustin & Kelley. .... Cleveland.  
White, Johnson, McCaslin & Cannon. .... Cleveland.  
Mackey & Bell. .... Buffalo.

## BOILER MANUFACTURERS.

Almy Water Tube Boiler Co. .... Providence, R. I.  
Detroit Screw Works. .... Detroit.  
Farrar & Trefts. .... Buffalo.  
Wm. Cramp & Sons. .... Philadelphia.  
W. & A. Fletcher Co. .... Hoboken, N. J.  
Gas Engine & Power Co. .... Morris Heights, N. Y.  
Mackinnon Mfg. Co. .... Bay City, Mich.  
Babcock & Wilcox Co. .... New York.  
Roberts Safety Water Tube Boiler Co. .... New York.  
S. F. Hodge & Co. .... Detroit.  
Kling Bros. .... Chicago.  
Chicago Ship Building Co. .... Chicago.  
Dry Dock Engine Works. .... Detroit.  
Cleveland Ship Building Co. .... Cleveland.  
Globe Iron Works Co. .... Cleveland.  
Pusey & Jones Co. .... Wilmington, Del.  
Newport News Ship Bldg. Co. .... Newport News, Va.

## BOILER CIRCULATORS.

H. Bloomsburg & Co. .... Newport News, Va.

## BOILER PLATES.

Bourne-Fuller Co. .... Cleveland.

## BOILER TUBES, SEAMLESS, COLD DRAWN.

Shelby Steel Tube Co. .... Cleveland.

## BOILER FURNACES, FIRE FRONTS, ETC.

Continental Iron Works. .... New York.

## BOILER AND PIPE COVERING.

H. W. Johns Mfg. Co. .... New York.

## BOILER STAYBOLT IRON.

Falls Hollow Staybolt Co. .... Cuyahoga Falls, O.

## BUCKETS, ORE AND COAL.

McMyler Mfg. Co. .... Cleveland.  
Brown Hoisting & Conveying Mach. Co. .... Cleveland.

## BEAM ENGINES.

W. & A. Fletcher Co. .... Hoboken, N. J.

## BLOCK MANUFACTURERS.

Cleveland Block Co. .... Cleveland.

## BLOWERS FOR FORCED DRAFT.

American Blower Co. .... Detroit.  
B. F. Sturtevant Co. .... Boston.

## BAROMETERS.

L. Black & Co. .... Detroit.  
John Bliss & Co. .... New York.  
Also most of the ship chandlers.

## BOAT BUILDERS.

Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated. .... New York.  
Thos. Drein & Son. .... Wilmington, Del.

## BROKERS.

See Vessel Agents.

## BRASS AND BRONZE CASTINGS.

Chas. Cory & Son. .... New York.  
Standard Brass Works. .... Kalamazoo, Mich.  
Wm. Cramp & Sons. .... Philadelphia.  
Magnolia Metal Co. .... New York.  
Detroit Sheet Metal & Brass Works. .... Detroit.

## BRIDGES, BUILDINGS, STRUCTURAL WORK.

Berlin Iron Bridge Co. .... East Berlin, Conn.

## CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co. .... Cleveland.

## CHAINS.

P. Hayden S. H. Co. .... Columbus, O.  
James McKay & Co. .... Pittsburgh, Pa.  
J. B. Carr Co. .... Troy, N. Y.  
Lebanon Chain Works. .... Lebanon, Pa.

## CHARTS AND SAILING DIRECTIONS.

Marine Review. .... Cleveland.

## CLASSIFICATION OF VESSELS.

Great Lakes Register. .... Chicago.

## COAL DEALERS.

See fueling concerns and coal shippers.

## COAL SHIPPERS.

Cuddy-Mullen Coal Co. .... Cleveland.  
M. A. Hanna & Co. .... Cleveland.  
Pickands, Mather & Co. .... Cleveland.  
Rochester & Pittsburgh Coal & Iron Co. .... Buffalo.  
Pittsburgh & Chicago Gas Coal Co. .... Cleveland.  
Osborne, Saeger & Co. .... Cleveland.  
Castner, Curran & Bullitt. .... Philadelphia.

## COAL AND ORE HANDLING MACHINERY.

Brown Hoisting & Conveying Mach. Co. .... Cleveland.  
McMyler Mfg. Co. .... Cleveland.  
Lidgerwood Mfg. Co. .... New York.

## COMPASSES.

John Bliss & Co. .... New York.  
L. Black & Co. .... Detroit.

## CAPSTANS.

American Ship Windlass Co. .... Providence, R. I.  
Hyde Windlass Co. .... Bath, Me.

## COPPER AND SHEET IRON WORK.

Detroit Sheet Metal & Brass Works. .... Detroit.  
Pusey & Jones Co. .... Wilmington, Del.

## COMPASS ADJUSTER.

Geo. A. Simpson. .... Sault Ste. Marie, Mich.

## CRANES.

Brown Hoisting & Conveying Mach. Co. .... Cleveland.  
McMyler Mfg. Co. .... Cleveland.  
Lidgerwood Mfg. Co. .... New York.

## CONDENSERS.

See pumps.

## CONTRACTORS FOR PUBLIC WORKS.

Cleveland Dredge Co. .... Cleveland.  
W. A. McGillis & Co. .... Cleveland.

## CORDAGE.

See ship chandlers.

## CORK JACKETS AND RINGS.

Armstrong Cork Co. .... Pittsburgh, Pa.

## DIVING APPARATUS.

A. J. Morse & Son. .... Boston.

## DREDGING AND DOCK CONTRACTORS.

W. A. McGillis & Co. .... Cleveland.  
Cleveland Dredge Co. .... Cleveland.

## DRY DOCKS.

American Steel Barge Co. .... West Superior, Wis.  
Chicago Ship Building Co. .... Chicago.  
Wm. Cramp & Sons. .... Philadelphia.  
Craig Ship Building Co. .... Toledo, O.  
Detroit Dry Dock Co. .... Detroit.  
Milwaukee Dry Dock Co. .... Milwaukee.  
Newport News Ship Bldg. Co. .... Newport News, Va.  
Pusey & Jones Co. .... Wilmington, Del.  
Ship Owners' Dry Dock Co. .... Cleveland.  
Cleveland Ship Building Co. .... Lorain.  
Union Dry Dock Co. .... Buffalo.

## ENGINE BUILDERS, MARINE.

Farrar & Trefts. .... Buffalo.  
W. & A. Fletcher Co. .... Hoboken, N. J.  
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated. .... New York.  
S. F. Hodge & Co. .... Detroit.  
Mackinnon Mfg. Co. .... Bay City, Mich.  
Pusey & Jones Co. .... Wilmington, Del.  
Newport News Ship Bldg. Co. .... Newport News, Va.  
Wm. Cramp & Sons. .... Philadelphia.  
Roach's Ship Yard. .... Chester, Pa.  
B. F. Sturtevant Co. .... Boston.  
Globe Iron Works Co. .... Cleveland.  
Cleveland Ship Building Co. .... Cleveland.  
Chase Machine Co. .... Cleveland.  
H. G. Trout. .... Buffalo.  
Dry Dock Engine Works. .... Detroit.  
American Steel Barge Co. .... West Superior, Wis.  
Chicago Ship Building Co. .... Chicago.  
Sheriffs Mfg. Co. .... Milwaukee.

## ENGINE ROOM TELEGRAPH.

Chas. Cory & Son. .... New York.  
Chadburn & Son. .... 11 Waterloo Rd., Liverpool.

## ENGINEERS' SUPPLIES.

Detroit Sheet Metal & Brass Works. .... Detroit.  
Chase Machine Co. .... Cleveland.

## ELECTRIC LIGHT AND POWER PLANTS.

General Electric Co. .... Schenectady, N. Y.  
B. F. Sturtevant Co. .... Boston.

## ELECTRIC HOISTS.

General Electric Co. .... Schenectady, N. Y.  
Lidgerwood Mfg. Co. .... New York.

## ENGINEERS, CONSULTING (MECHANICAL AND MARINE).

Miers Coryell. .... New York.  
John Haug. .... Philadelphia.  
Ambrose V. Powell. .... Chicago.  
W. J. Wood. .... Chicago.  
Walter Miller. .... Cleveland.  
Joseph R. Oldham. .... Cleveland.

## FORGES FOR RIVET HEATING.

Crumlish Forge Co. .... Buffalo.

## EOPHONES.

Eophone Co. .... New York.

## FANS FOR VENTILATION.

American Blower Co. .... Detroit.  
B. F. Sturtevant Co. .... Boston.

## FEED WATER PURIFIER AND HEATERS.

Robert Learmonth. .... Buffalo.

## FORGINGS, IRON AND STEEL.

Cleveland City Forge & Iron Co. .... Cleveland.  
Bethlehem Iron Co. .... South Bethlehem.

## FLUSHOMETERS.

Kenney Co., The. .... New York.

## FORWARDERS OF FREIGHT.

Thomas Wilson. .... Cleveland.  
C. H. Tucker. .... Cleveland.  
Bessemer Steamship Co. .... Cleveland.

## FUELING COMPANIES AND COAL DEALERS.

Cuddy-Mullen Coal Co. .... Cleveland.  
James Graham & Co. .... Detroit.  
M. A. Hanna & Co. .... Cleveland.  
Mark H. Hanlon. .... Cleveland.  
Pickands, Mather & Co. .... Cleveland.  
O. S. Richardson Fueling Co. .... Chicago.  
Stanley B. Smith & Co. .... Detroit.  
Pittsburgh & Chicago Gas Coal Co. .... Cleveland.  
Rochester & Pittsburgh Coal & Iron Co. .... Buffalo.  
Port Royal Dock Co. .... Sault Ste. Marie, Mich.

Youghiogheny & Lehigh Coal Co. .... Chicago.  
Osborne, Saeger & Co. .... Cleveland.  
Castner, Curran & Bullitt (Pocahontas). .... Philadelphia.

## FLAGS AND BUNTING.

See ship chandlers.

## FIXTURES FOR LAMPS, OIL AND ELECTRIC.

Wm. Porter's Sons. .... New York.  
Page Bros. & Co. .... Boston.

## FURNACES FOR BOILERS.

Continental Iron Works. .... New York.

## GAS BUOYS.

Safety Car Heating & Lighting Co. .... New York.

## GAS ENGINES.

McMyler Mfg. Co. .... Cleveland.

## GLASSES, MARINE.

See ship chandlers and dealers in nautical instruments.

## GAUGES, STEAM.

Crosby Steam Gauge & Valve Co. .... Boston.  
See also valves and engineers' supplies.

## GRAPHITE.

Joseph Dixon Crucible Co. .... Jersey City, N. J.

## GREASE CUPS.

See engineers' supplies.

## HEATERS, STEAM.

American Blower Co. .... Detroit.

## HARDWARE, MARINE.

L. W. Ferdinand & Co. .... Boston.  
Detroit Sheet Metal & Brass Works. .... Detroit.

## HOISTING ENGINES.

Chase Machine Co. .... Cleveland.  
S. F. Hodge & Co. .... Detroit.  
Jackson & Church. .... Saginaw.  
Lidgerwood Mfg. Co. .... New York.  
Marine Iron Co. .... Bay City.  
Globe Iron Works Co. .... Cleveland.  
Williamson Bros. .... Philadelphia.  
Hyde Windlass Co. .... Bath, Me.

## HOSE FOR DECK AND FIRE PURPOSES.

The Manhattan Rubber Mfg. Co. .... New York, Cleveland and Chicago.

## HAMMERS, POWER DROP.

Chase Machine Co. .... Cleveland.

## INDICATORS, CALL BELLS.

Chas. Cory & Son. .... New York.  
Chadburn & Son. .... 11 Waterloo Rd., Liverpool.

## INJECTORS.

Jenkins Bros. .... New York.

## INSURANCE, MARINE.

Chas. E. & W. F. Peck. .... New York and Chicago.  
Johnson & Higgins. .... Main office in New York.  
Insurance Co. of North America, represented by Geo. L. McCurdy. .... Chicago.  
Brown & Co. .... Buffalo.  
C. W. Elphicke & Co. .... Chicago.  
J. G. Keith & Co. .... Chicago.  
La Salle & Co. .... Duluth.  
Parker & Millen. .... Detroit.  
Mitchell & Co. .... Cleveland.  
W. C. Richardson. .... Cleveland.  
Hawgood & Moore. .... Cleveland.  
John Gordon & Co. .... Buffalo.  
Drake & Maytham. .... Buffalo.  
Hutchinson & Co. .... Cleveland.  
C. R. Jones & Co. .... Cleveland.  
J. H. Bartow. .... Cleveland.

## IRON ORE AND PIG IRON.

M. A. Hanna & Co. .... Cleveland.  
Pickands, Mather & Co. .... Cleveland.

## LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.

Armstrong Cork Co. .... Boston.  
Detroit Sheet Metal & Brass Works. .... Detroit.  
Thos. Drein & Son. .... Wilmington, Del.  
D. Kahnweiler. .... New York.

## LIGHTS, PORTABLE, SELF-CONTAINED.

The Wells Light Mfg. Co. .... New York.

## LIGHTS, SIDE AND SIGNAL.

Page Bros. & Co. .... Boston.  
Wm. Porter's Sons. .... New York.

## MANILA ROPE.

Upson-Walton Co. .... Cleveland.  
H. H. Baker & Co. .... Buffalo.

## MARINE GLASSES, BAROMETERS, ETC.

L. Black & Co. .... Detroit.  
John Bliss & Co. .... New York.  
Also most of the ship chandlers.

## METALLIC PACKING.

U. S. Metallic Packing Co. .... Philadelphia.  
L. Katzenstein & Co. .... New York.

## MARINE TELEGRAPH.

Chas. Cory & Son. .... New York.  
Chadburn & Son. .... 11 Waterloo Rd., Liverpool.

## METALS FOR BEARINGS.

Magnolia Metal Co. .... New York.  
Phosphor Bronze Smelting Co., Ltd. .... Philadelphia.  
Falls Hollow Staybolt Co. .... Cuyahoga Falls, O.

## MAGNOLIA METAL.

Magnolia Metal Co. .... New York.

## METALLIC LIFE BOATS.

Thos. Drein & Son. .... Wilmington, Del.  
D. Kahnweiler. .... New York.

## MARINE GLUE.

L. W. Ferdinand & Co. .... Boston.

## NAUTICAL INSTRUMENTS.

John Bliss & Co. .... New York.  
L. Black & Co. .... Detroit.



## BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

**NAPHTHA LAUNCHES.**  
Gas Engine & Power Co.....New York.

**NAVAL ARCHITECTS.**  
Frank E. Kirby .....Detroit.  
W. J. Wood .....Chicago.  
John Haug .....Philadelphia.  
Joseph R. Oldham .....Cleveland.  
Robert Curr .....Cleveland.

**OAK TIMBER AND PLANK.**  
Martin-Barriss Co. ....Cleveland.

**OILS AND LUBRICANTS.**  
Jos. Dixon Crucible Co.....Jersey City, N. J.  
Lake Carriers' Oil Co.....Cleveland.  
Standard Oil Co. ....Cleveland.

**PATENT ATTORNEY.**  
Wm. M. Monroe.....Cleveland.

**PNEUMATIC TOOLS.**  
Chicago Pneumatic Tool Co.....Chicago.

**POCAHONTAS COAL.**  
Castner, Curran & Bullitt.....Philadelphia.

**PROPELLER WHEELS.**  
Dry Dock Engine Works .....Detroit.  
Cleveland Ship Building Co.....Cleveland.  
Globe Iron Works Co.....Cleveland.  
Farrar & Trefts .....Buffalo.  
Newport News Ship Bldg. Co.....Newport News, Va.  
Pusey & Jones Co.....Wilmington, Del.  
S. F. Hodge & Co.....Detroit.  
Wm. Cramp & Sons.....Philadelphia.  
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.  
Mackinnon Mfg. Co.....Bay City.  
Sheriffs Mfg. Co.....Milwaukee.  
H. G. Trout .....Buffalo.  
Hyde Windlass Co.....Bath, Me.

**PRESSURE REGULATORS AND REDUCING VALVES.**  
G. M. Davis & Co.....Chicago.  
Foster Engineering Co.....Newark, N. J.

**PACKING.**  
A. W. Chesterton & Co.....Boston.  
H. W. Johns Mfg. Co.....New York.  
Jenkins Bros. ....New York.  
L. Katzenstein & Co.....New York.  
Manhattan Rubber Mfg. Co.....New York.  
U. S. Metallic Packing Co.....Philadelphia.  
Peerless Rubber Mfg. Co.....New York.

**PAINTS.**  
Upson-Walton Co. ....Cleveland.  
Howard H. Baker & Co.....Buffalo.

**PUMPS, STEAM.**  
Geo. F. Blake Mfg. Co.....New York.  
Henry R. Worthington.....New York.  
Davidson, M. T. ....Brooklyn, N. Y.

**PUMPS, ELECTRIC.**  
General Electric Co.....Schenectady, N. Y.

**RELEASING HOOKS FOR DETACHING BOATS.**  
Standard Aut. Releasing Hook Co.....New York.

**RIVETS, STEEL.**  
Bourne-Fuller Co. ....Cleveland.

**RUBBER GOODS FOR STEAMERS.**  
Manhattan Rubber Mfg. Co.....New York and Cleveland.  
Peerless Rubber Mfg. Co.....New York.

**RUBBER INSULATED WIRES.**  
John A. Roebling's Sons..New York and Cleveland.

**SAIL MAKERS.**  
Howard H. Baker & Co.....Buffalo.  
Upson-Walton Co. ....Cleveland.

**SHIP PLATES, STEEL.**  
Bourne-Fuller Co. ....Cleveland.

**SALVAGE COMPANIES.**  
See wrecking companies.

**STAYBOLT IRON, Hollow and Solid.**  
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

**SEARCH LIGHTS.**  
General Electric Co.....Schenectady, N. Y.

**STEAMSHIP LINES, PASS. AND FREIGHT.**  
Cleveland & Buffalo Transit Co.....Cleveland.  
Detroit & Cleveland Navigation Co.....Detroit.  
Goodrich Transportation Co. ....Chicago.  
Lackawanna-Green Bay Line, C. H. Tucker....Cleveland.  
Lake Michigan & Lake Superior Trans. Co.....Chicago.  
Northern Steamship Co. ....Buffalo.  
Ogdensburg Transit Co.....Ogdensburg, N. Y.  
Northern Transit Co.....Cleveland.  
Graham & Morton Trans. Co.....Chicago.

**SURVEYORS, MARINE.**  
Robert Curr .....Cleveland.  
Capt. D. McLeod .....Cleveland.  
Joseph R. Oldham .....Cleveland.

**SHIP CHANDLERS.**  
Howard H. Baker & Co.....Buffalo.  
Upson-Walton Co. ....Cleveland.

**SOUND DETECTORS.**  
Eophone Co. ....New York.

**STEAM, VACUUM AND HYDRAULIC SPECIALTIES.**  
William Craig .....New York.

**SHIP BUILDERS.**  
American Steel Barge Co.....West Superior, Wis.  
Craig Ship Building Co.....Toledo, O.  
Chicago Ship Building Co.....Chicago.  
Detroit Dry Dock Co.....Detroit.  
Wm. Cramp & Sons.....Philadelphia.  
Newport News Ship Bldg. Co.....Newport News, Va.  
Cleveland Ship Building Co.....Cleveland.  
Globe Iron Works Co.....Cleveland.  
Roach's Ship Yard.....Chester, Pa.  
Pusey & Jones Co.....Wilmington, Del.  
Union Dry Dock Co.....Buffalo.

**STOCKLESS ANCHORS.**  
Baldt Anchor Co.....Chester, Pa.  
International Anchor Co.....Cleveland.

**STEERING ENGINES.**  
Pawling & Harnischfeger .....Milwaukee.  
Sheriffs Mfg. Co.....Milwaukee.  
Chase Machine Co. ....Cleveland.  
Globe Iron Works Co.....Cleveland.  
Williamson Bros. ....Philadelphia.  
Hyde Windlass Co.....Bath, Me.

**STEAM VESSELS FOR SALE.**  
Samuel Holmes.....New York.

**TRAPS, STEAM.**  
Wm. S. Haines Co.....Philadelphia.

**TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.**  
Bement, Miles & Co.....Philadelphia.  
Chicago Pneumatic Tool Co.....Chicago.  
Hilles & Jones Co.....Wilmington, Del.

**TOWING MACHINES.**  
American Ship Windlass Co.....Providence, R. I.

**TOWING COMPANIES.**  
Barry Bros. Independent Tug Line.....Chicago.  
Escanaba Towing & Wrecking Co.....Escanaba, Mich.  
The Vessel Owners' Towing Co.....Cleveland.

**TUBING, COPPER AND BRASS.**  
Randolph & Clowes .....Waterbury, Conn.

**VALVES.**  
Crosby Steam Gauge & Valve Co.....Boston.  
Jenkins Bros. ....New York.  
G. M. Davis Co.....Chicago.  
Foster Engineering Co.....Newark, N. J.

**VESSEL AND FREIGHT AGENTS.**  
Brown & Co. ....Buffalo.  
J. H. Bartow .....Cleveland.  
Drake & Maytham .....Buffalo.  
C. W. Elphicke & Co.....Chicago.  
John Gordon & Co.....Buffalo.  
Hawgood & Moore .....Cleveland.  
Hutchinson & Co. ....Cleveland.  
C. R. Jones & Co.....Cleveland.  
Mitchell & Co. ....Cleveland.  
W. C. Richardson .....Cleveland.  
Samuel Holmes .....New York.

**WIRE ROPE.**  
John A. Roebling's Sons..New York and Cleveland.  
Upson-Walton Co. ....Cleveland.  
H. H. Baker & Co.....Buffalo.  
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

**WHISTLES, STEAM.**  
Crosby Steam Gauge & Valve Co.....Boston.

**WINDLASSES.**  
American Ship Windlass Co.....Providence, R. I.  
Hyde Windlass Co.....Bath, Me.  
Globe Iron Works Co.....Cleveland.

**WINCHES.**  
American Ship Windlass Co.....Providence, R. I.  
Hyde Windlass Co.....Bath, Me.

**WRECKING AND SALVAGE COMPANIES.**  
Escanaba Towing & Wrecking Co.....Escanaba, Mich.  
Donnelly Salvage & Wrecking Co.....Kingston, Ont.  
Swain Wrecking Co. ....Detroit.  
Vessel Owners' Towing Co.....Cleveland.

**YACHT BOILERS.**  
Detroit Screw Works.....Detroit.

**YACHT PLUMBERS.**  
Alfred B. Sands & Son.....New York.

**YACHT AND BOAT BUILDERS.**  
Thos. Drein & Son.....Wilmington, Del.  
Gas Engine & Power Co.....New York.

**YACHT, BOAT AND CANOE HARDWARE.**  
L. W. Ferdinand & Co.....Boston.

**YAWLS.**  
Thos. Drein & Son.....Wilmington, Del.

## Alphabetical List of Marine Review Advertisers.

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Baldt Anchor Co.....	20	Drake & Maytham.....	4	Lackawanna-Green Bay Line.....	4	Porter's, Wm., Sons.....	19
Barry Bros. Independent Tug Line..	7	Drein, Thos. & Son.....	19	Lebanon Chain Works.....	18	Pusey & Jones Co.....	18
Baker, Howard H. & Co.....	21	Dry Dock Engine Works.....	3	L. S. & M. S. Ry.....	27	Randolph & Clowes.....	1
Bartow, J. H.....	4	Elphicke, C. W. & Co.....	5	*Lake Carriers' Oil Co.....	20	Richardson, W. C.....	4
Bement, Miles & Co.....	22	Eophone Co.....	4	La Salle & Co.....	18	Richardson, O. S., Fueling Co.....	8
Berlin Iron Bridge Co.....	22	Escanaba Towing & Wrecking Co.....	19	*Learmonth, Robert .....	24	Roach's Ship Yard.....	18
Bessemer Steamship Co.....	18	Farrar & Trefts .....	27	Lidgerwood Mfg. Co.....	5	Roberts Safety Water Tube Boiler	
Bethlehem Iron Co.....	6	Falls Hollow Staybolt Co.....	6	McGillis & Co., W. A.....	8	Co.....	19
Bourne-Fuller Co. ....	8	Farasey & Marron.....	23	McKay, James & Co.....	17	*Roebling's, John A., Sons Co.....	28
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Castner, Curran & Bullitt.....	27	Gordon, John & Co.....	4	Mackey & Bell .....	4	Standard Brass Works.....	18
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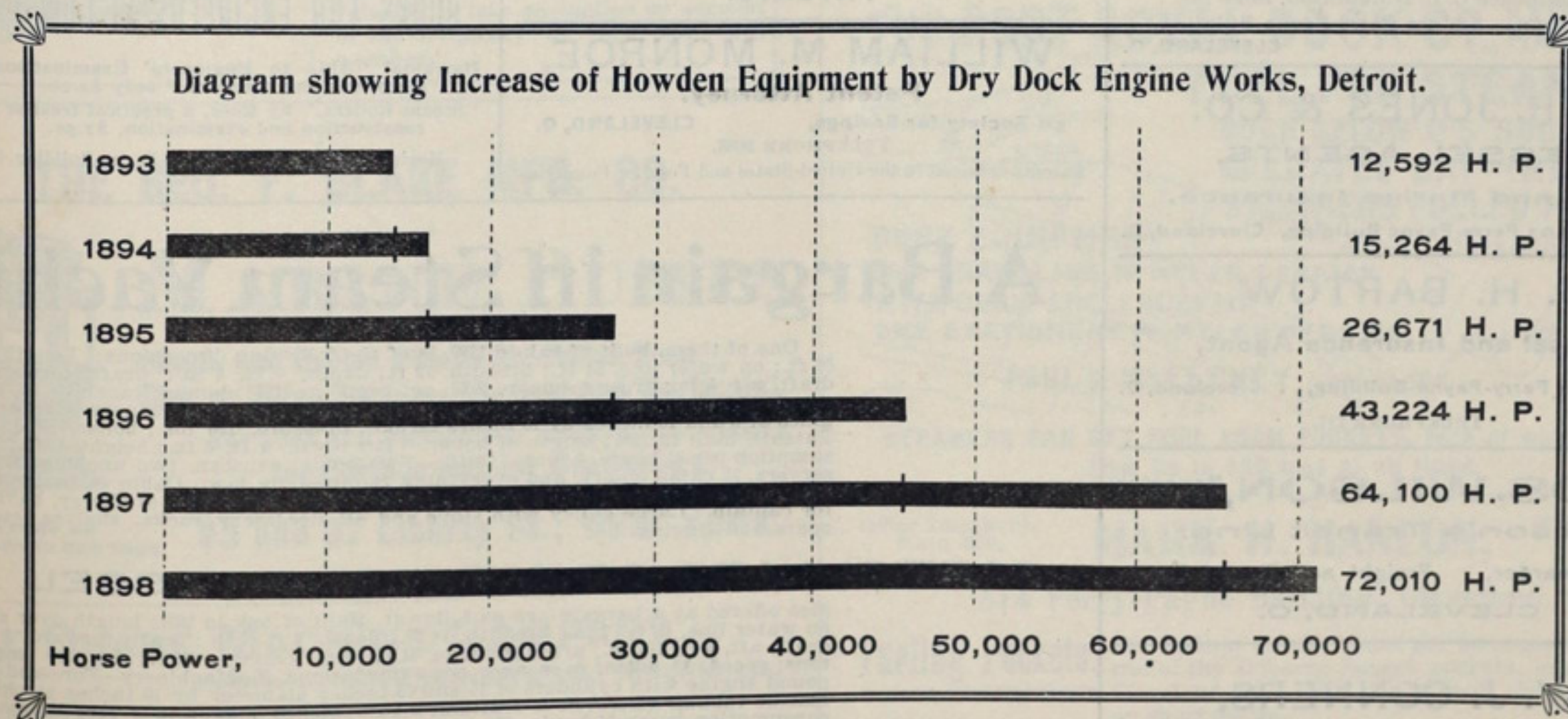
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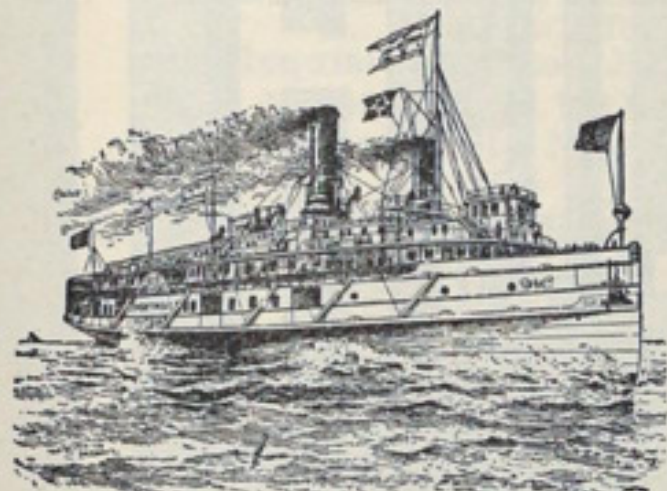
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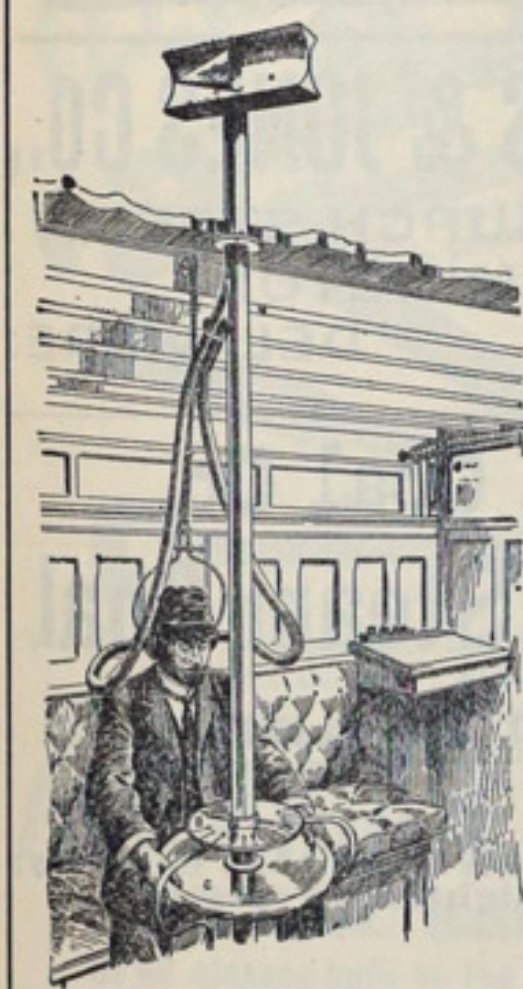
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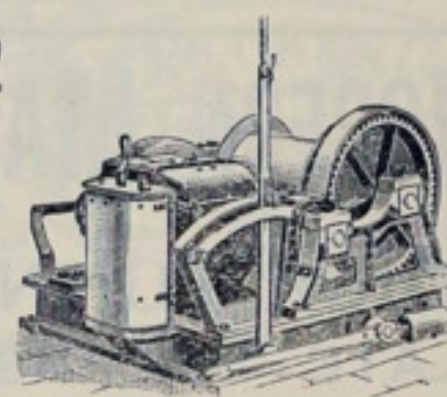
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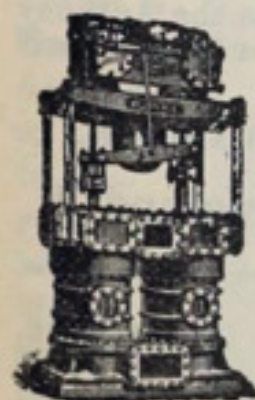
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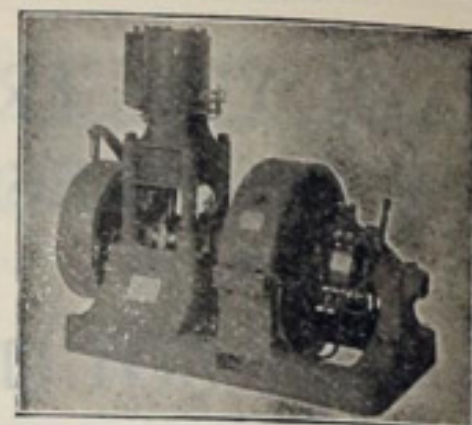
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NAVY DEPARTMENT,  
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In reply refer to No. 29181.

Gentlemen:

June 10, 1898.

1. Please forward to the Commanding Officer, U. S. S. 'MARIETTA', Key West, Fla., 8 fire bricks, 4 rights and 4 lefts, No. R, 3440, Babcock & Wilcox boilers, to replace broken bricks between furnace doors.
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THE BABCOCK & WILCOX CO.,  
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Respectfully,

(Sig.) EDWIN STEWART, Paymaster General,  
U. S. N.

On her long voyage the MARIETTA was not detained an instant on account of boilers.

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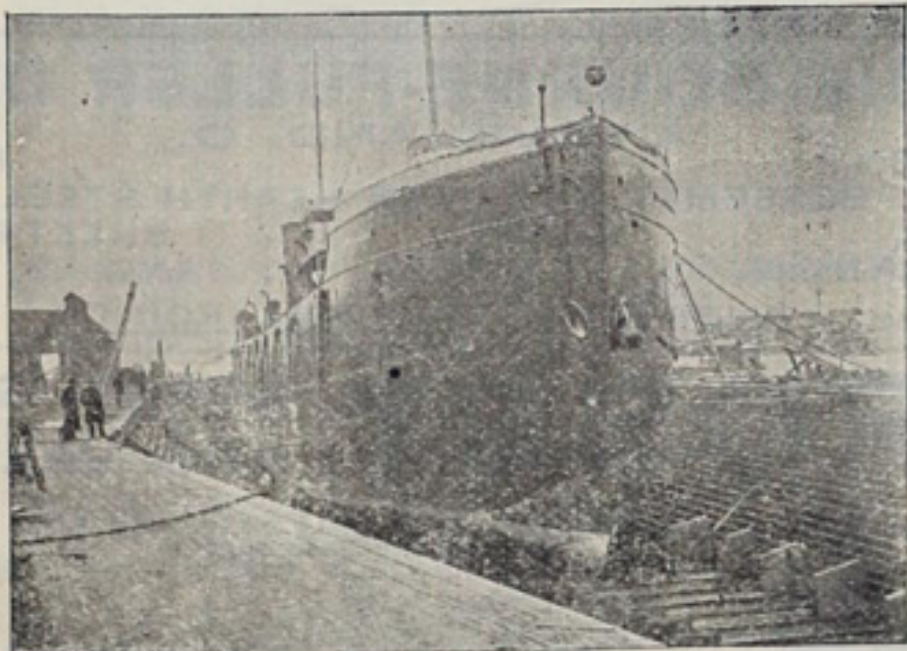
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Length, extreme.....537 feet.	Entrance, Top.....55 feet 9 in
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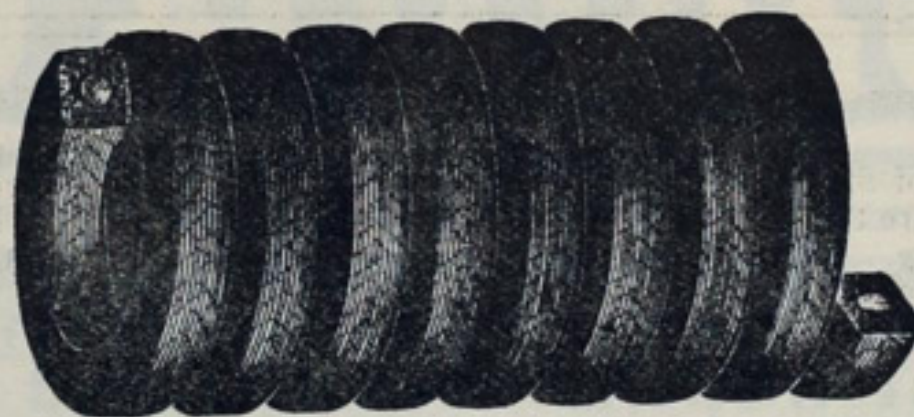
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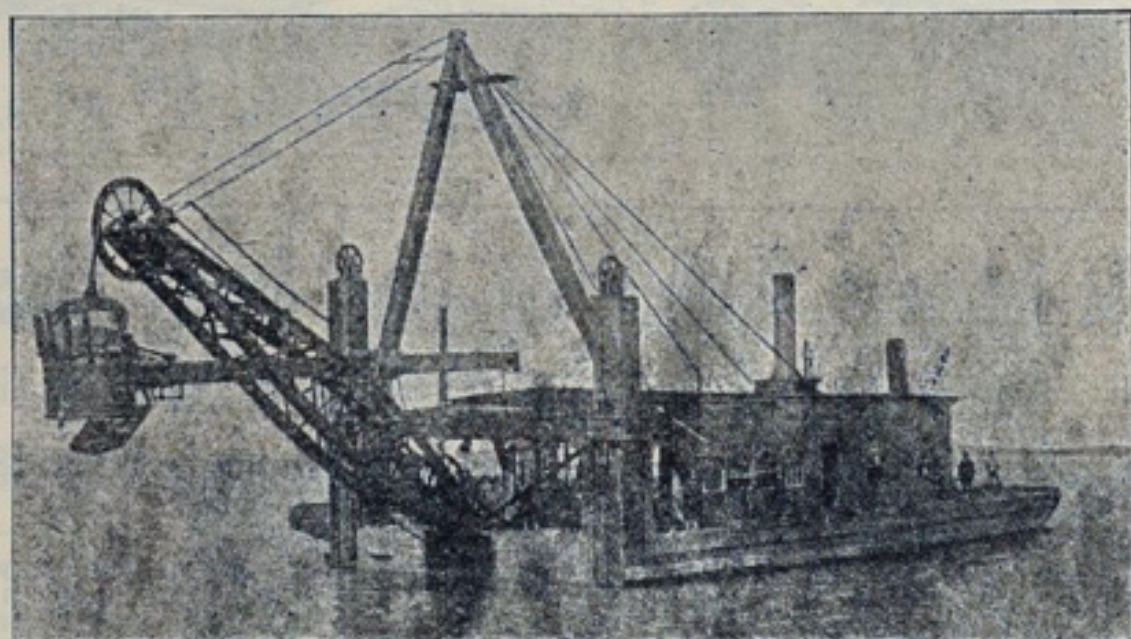
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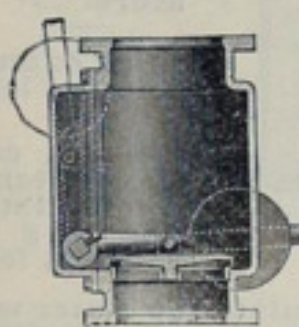
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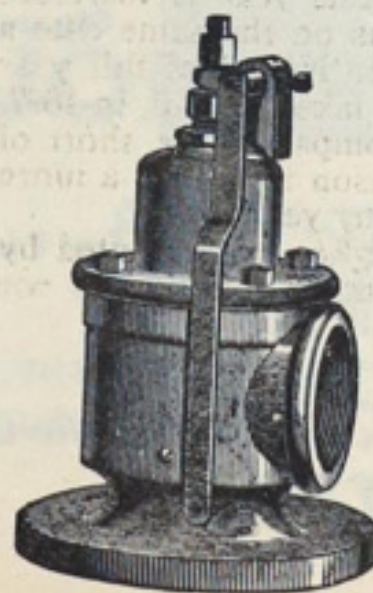


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